TECHNOLOGY DEPT.

September, 1950

THE FOUNDRY

wherever metals are cast...

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DETROIT

Another Federal "FIRST"

"SAN-BLO" . . . the only all-purpose blower designed for use in both jobbing and production foundries.

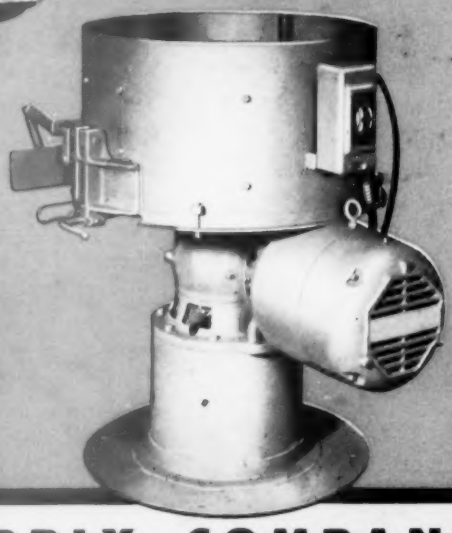
Bench Model CB-40 with Universal Vent Plate Attachment

blows...
through one blow hole...

all kinds of core sand
(dry compound, oil sand, facing sand)
high green strength sand
high moisture sand
large and small cores
open and closed boxes

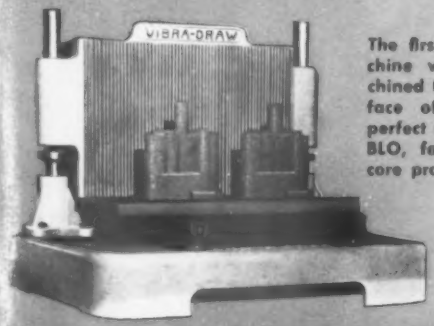
Bench and Floor Models

"WHIRLMIX"
Sand Mixer



The first mixer with flexible, whirling rubbing arms. Produces fluffy, aerated, thoroughly mixed sand without overheating, or crushing sand grains. Mixes 4,000 lbs. of sand per hour.

"VIBRA-DRAW"
Core Drawing Machine



The first core drawing machine with accurately machined (not cast) grooves on face of draw head. The perfect team mate for SAN-BLO, for faster and better core production.

THE FEDERAL FOUNDRY SUPPLY COMPANY

4600 East 71st Street • Cleveland 5, Ohio

Sales Offices in NEW YORK RICHMOND, VA. CHATTANOOGA DETROIT CHICAGO MILWAUKEE LOS ANGELES

how PURITE assures Cleaner Iron Better Castings through

CONVENIENT, ECONOMICAL, EFFECTIVE FLUXING and DESULPHURIZING

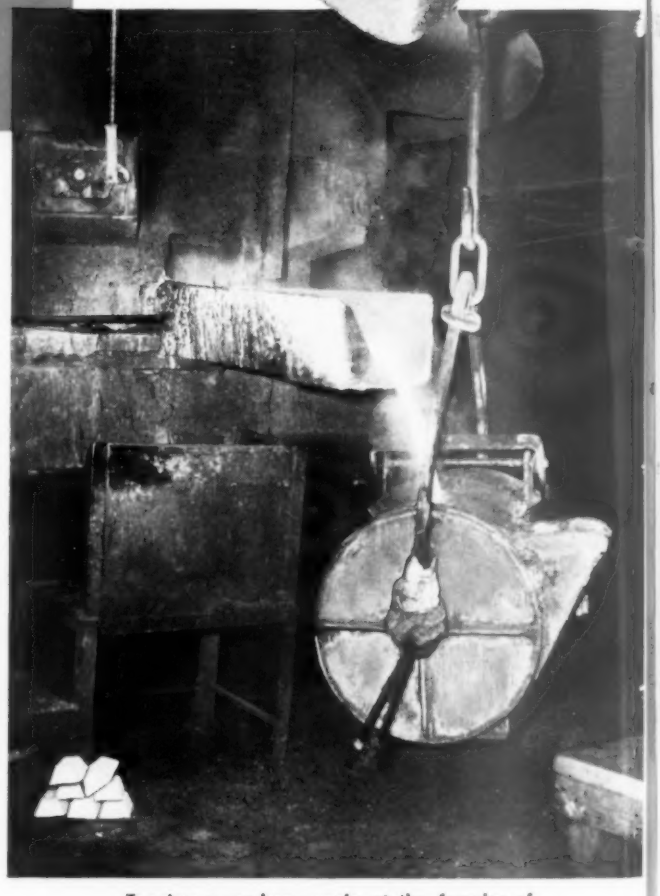
PURITE 100% FUSED SODA ASH

The Scientific Flux for Better Melting and Cleaner Iron

Purite is a country-wide foundry favorite. This broad acceptance is based on proven performance in producing better castings. Here are the reasons why Purite is first choice in foundry after leading foundry:

1. **Purite gives 100% fluxing action in the cupola—100% desulphurizing action in the ladle.**
2. **Purite gets to the iron faster—no quicker desulphurizer made.**
3. **Purite is time-tested and proven for unsurpassed desulphurizing uniformity.**
4. **Purite comes in 2 lb. pigs—no weighing or measuring required.**
5. **Purite is 100% pure fused soda ash—you do not pay for inert materials.**
6. **Purite does not crumble—no waste—no dust.**
7. **Purite can be shipped in bulk carloads at substantial savings over bag shipments—is easily stored without deterioration.**

For nearly 30 years there's been no substitute for this successful product. Confirm Purite's many advantages by an actual trial in your own cupolas and ladles. If you need further information, please write today to: Mathieson Chemical Corporation, Mathieson Building, Baltimore 3, Maryland.



Tapping a modern cupola at the foundry of Mack Trucks, Inc., at New Brunswick, N. J.

Mathieson CHEMICALS

Purite is sold by all leading foundry supply houses in the United States and Canada.

SERVING INDUSTRY, AGRICULTURE AND PUBLIC HEALTH

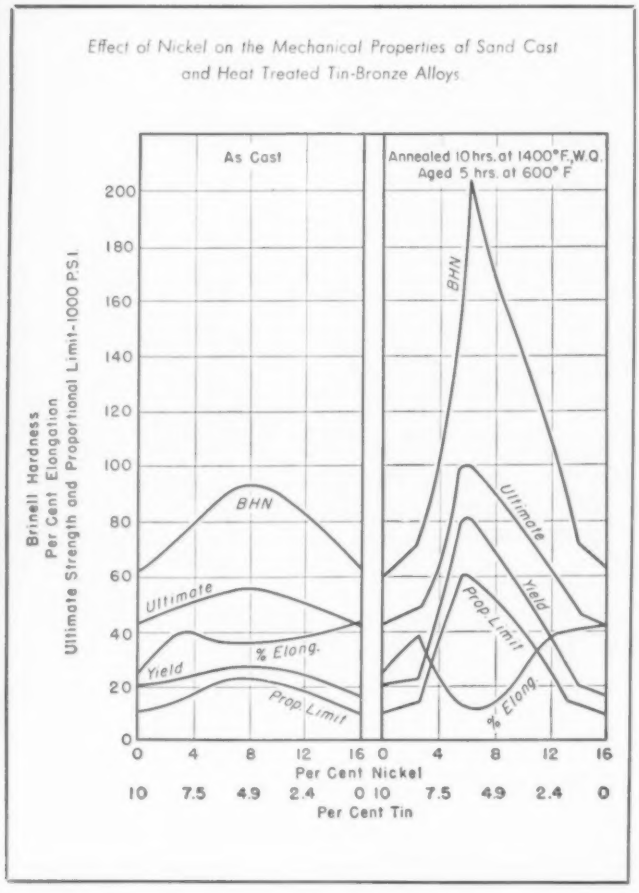
8379

How Bronzes Containing NICKEL Provide Improved Properties

Copper-base alloys provide outstanding advantages to users and producers, alike. These are enhanced when moderate amounts of nickel are utilized.

HOW NICKEL IMPROVES CAST BRONZE

For instance . . . small percentages of nickel refine the grain, strengthen the alloy, and improve its resistance to wear and corrosion. By increasing fluidity in the casting mixture, nickel affords a wider casting range, and thus helps to minimize misruns and to improve density and pressure-tightness.


Effect of Nickel on the Mechanical Properties of Sand Cast and Heat Treated Tin-Bronze Alloys
As Cast
Annealed 10 hrs. at 1400°F, W.Q.
Aged 5 hrs. at 600° F
Brinell Hardness
Per Cent Elongation
Ultimate Strength and Proportional Limit-1000 PSI
BHN
Ultimate
% Elong.
Yield
Prop. Limit
0 4 8 12 16 0 4 8 12 16
Per Cent Nickel
10 7.5 4.9 2.4 0 10 7.5 4.9 2.4 0
Per Cent Tin

RESPONSE TO HEAT TREATMENT

In certain cases, a moderate nickel content makes possible the response to heat treatment which increases the tensile and compressive strength, being particularly effective in raising elastic properties.

Certain cast nickel bronzes are very responsive to heat treatment. The hardness of an alloy containing 7.5 per cent nickel and 8 per cent tin, for example, can be increased from about 75 to 277 BHN by appropriate heat treatment.

TYPICAL APPLICATIONS

Typical applications of nickel bronzes include worm wheels, gears, liners, bushings, bearing backs, valve guides and seats, pumps, valves, fittings, plumbing goods, miscellaneous structural and engineering uses.

COUNSEL AND DATA

Nickel alloyed bronzes offer significant advantages. Whatever your industry, we solicit the opportunity to help you with counsel and data pertaining to these economical alloys. Write for recommendations regarding the best types for your applications. Mail the coupon now.

EMBLEM OF INCO SERVICE

The International Nickel Company, Inc.
Department F, 67 Wall St., New York 5, N. Y.

Gentlemen:

Please send booklet: "The Role of Nickel in Cast Bronze."

Name.....*Title*.....

Company.....

Address.....

City.....*State*.....

THE INTERNATIONAL NICKEL COMPANY, INC.

67 WALL STREET
NEW YORK 5, N. Y.

Why reach for the moon?

THERE'S NO CLAY UP THERE, ANYWAY . . .
WHEN FOUNDRYMEN REACH FOR THE FINEST
CLAY BOND AVAILABLE, THEY REACH FOR

FEDERAL

GREEN BOND

Best of the Wyoming Bentonites

THE FEDERAL FOUNDRY SUPPLY COMPANY

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SEPTEMBER, 1950

THE FOUNDRY

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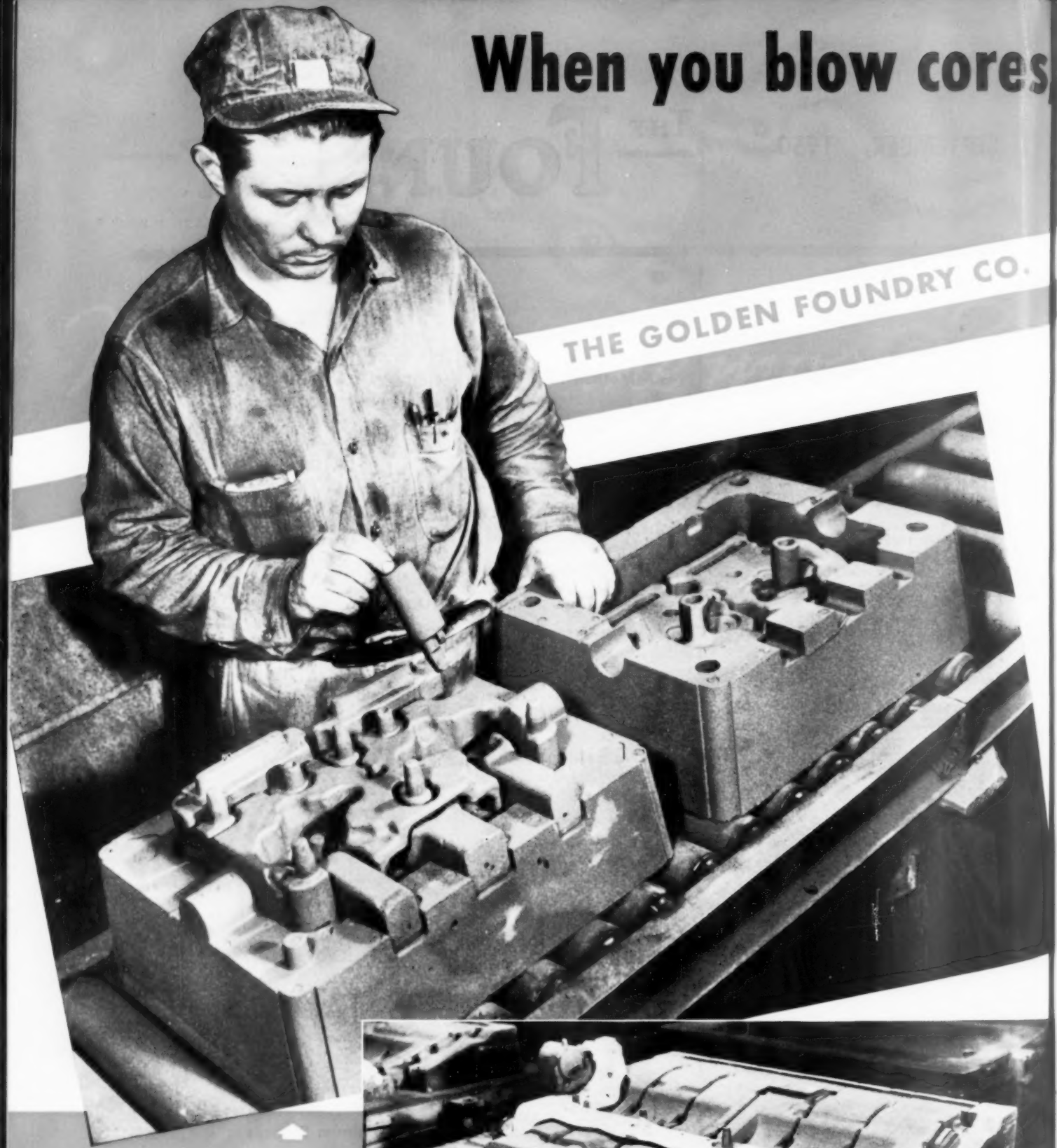
When you blow cores, u

THE GOLDEN FOUNDRY CO. CO



Inspecting the cores in a dry-sand mold for a Model "H" head casting. 42 separate cores are required to make a complete assembly.

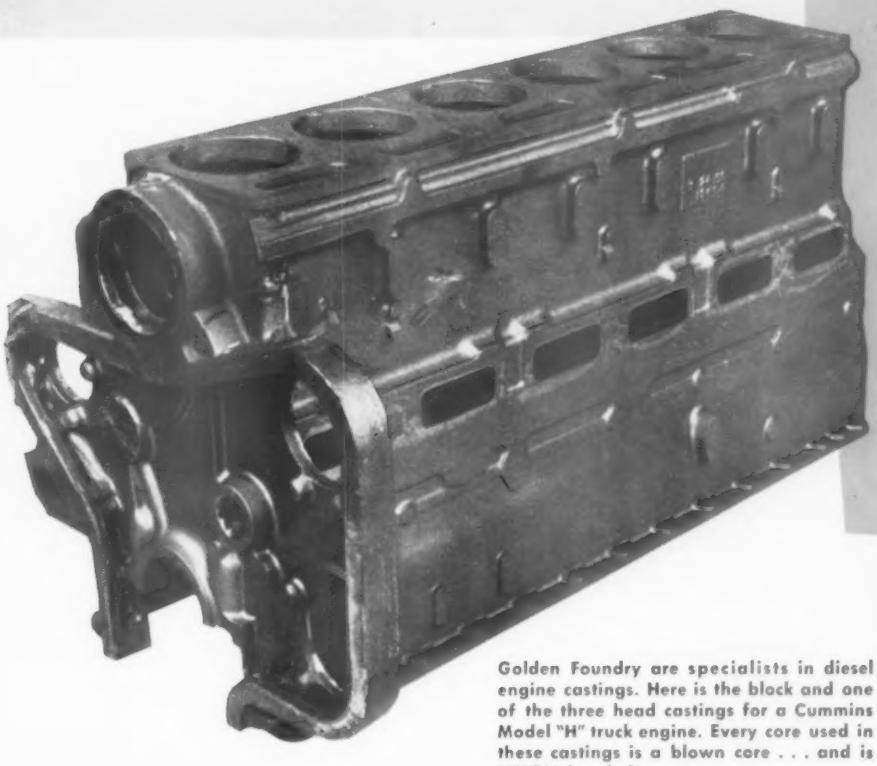
The cored drag for a Model "H" block. Each one of the twelve barrel core sections is blown right to size—eliminating rubbing during assembly.

es use LINOIL for best results!

COLUMBUS, INDIANA

Core blowing is the modern way to mass-produce cores. One blower and a roll-over machine can serve several different core boxes in rotation: output is increased and labor is minimized.

A proper sand mix is one of the basic requirements for good blowing practices—and that's where LINOIL lends a hand. By taking advantage of LINOIL'S high binding strength, you can use a minimum of oil per batch of sand... avoid chances of a sticky, soggy core mix. And LINOIL demonstrates its free-working properties... the most intricate core will draw smooth and accurate, when it's LINOIL-bonded.



If you're not obtaining satisfactory results with your core-blowing, ask your LINOIL representative for his suggestions. His years of experience with various problems in many different foundries, will enable him to help you.

Golden Foundry are specialists in diesel engine castings. Here is the block and one of the three head castings for a Cummins Model "H" truck engine. Every core used in these castings is a blown core . . . and is LINOIL-bonded.

LINOIL THE LOGICAL OIL

ARCHER-DANIELS-MIDLAND COMPANY

(THE WERNER G. SMITH COMPANY DIV.)

2191 WEST 110th STREET · CLEVELAND 2, OHIO

Famous Pangborn ROTOBLAST Tables *(as shown here) are designed for low-cost, high-quality cleaning of flat and fragile forgings, many kinds of malleable and non-ferrous castings, heat treated parts, etc. For work like this you'll find ROTOBLAST Tables ideal!*

FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION INC. MEMBER FEMA

Pangborn

* Trademark of Pangborn Corporation

SAVE SAVE

on BLAST CLEANING with PANGBORN ROTOBLAST*

ROTOBLAST makes cash savings possible these five different ways:

SAVES LABOR: *One ROTOBLAST machine and operator can do as much as a two-man crew and old-fashioned equipment.*

SAVES SPACE: *In many cases, one ROTOBLAST machine replaces five or more old-fashioned machines, requires less space.*

SAVES TIME: *Cases on record prove ROTOBLAST can cut cleaning time up to 95.8% compared to older methods.*

SAVES POWER: *Modern ROTOBLAST uses but 15-20 h.p. compared to old-fashioned equipment requiring 120 h.p. for same job.*

SAVES TOOLS: *On work cleaned with ROTOBLAST, cutting tools last up to 3 times longer because no scale is left to dull edges.*

SAVINGS mean PROFITS

BY THE WEEK: One foundry, with ROTOBLAST, slashes *$211.56* every week off their blast cleaning bill. An additional saving in this case is *lower breakage losses*—important in any foundry producing intricate and fragile castings.

BY THE MONTH: One more foundry credits ROTOBLAST with saving $423.30 *each month* on blast cleaning. To prove that blast cleaning goes faster with ROTOBLAST, castings are now cleaned in 1/3 the time it used to take!

BY THE YEAR: $10,160 saved on labor alone each year—that's the story from a large ROTOBLAST-equipped foundry. But there are still more savings: five old-fashioned machines with bothersome dust have been completely eliminated—important for a foundry where space is at a premium!

Find out how much you can save!

If you're hampered by old-fashioned blast cleaning methods, you can *save money* with ROTOBLAST. There's a modern, economical, efficient ROTOBLAST *Barrel*, *Room*, *Table* or *Table-Room* especially designed to solve every blast cleaning problem. Let Pangborn engineers show what ROTOBLAST can do for you. Write today for Bulletin 214 to PANGBORN CORPORATION, 1400 Pangborn Blvd., Hagerstown, Maryland.

Look to Pangborn for the Latest Developments in Blast Cleaning and Dust Control Equipment

MORE THAN 25,000 PANGBORN MACHINES SERVING INDUSTRY

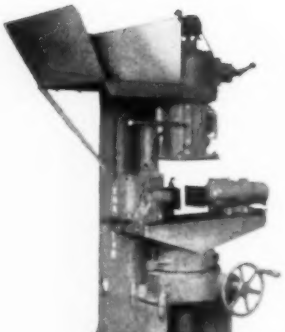
BLAST CLEANS CHEAPER

with the right equipment for every job

KEEP IN THE BIDDING . . .

"Championize"

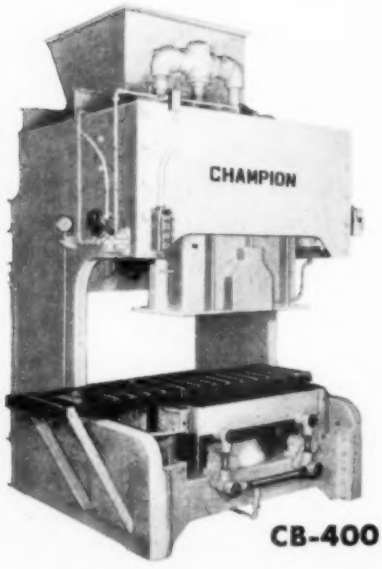
and sell



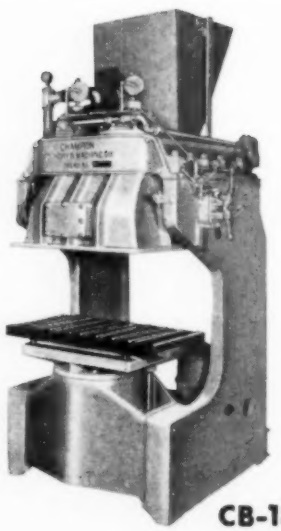
CB-10

CB-5

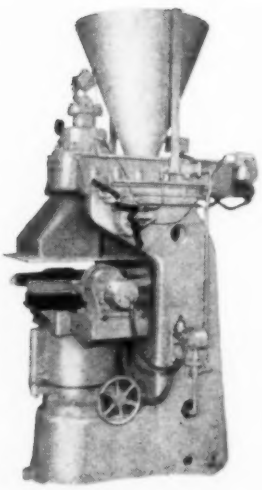
The broad line of Champion Core Blowers includes a size and type for your every core blowing requirement. From the newest, smallest model, the CB-5 (Junior) up to the mammoth CB-400 every Champion possesses the same safe, simple, speedy operation . . . the same distinctive blow valve that assures a perfect core in a fraction of a second with the standard air pressure of 85 to 100 pounds.



CB-400

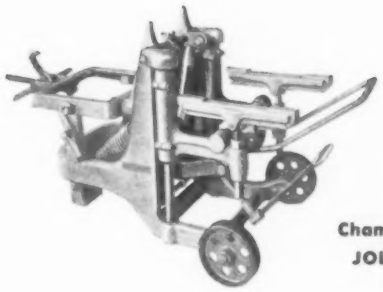


CB-18

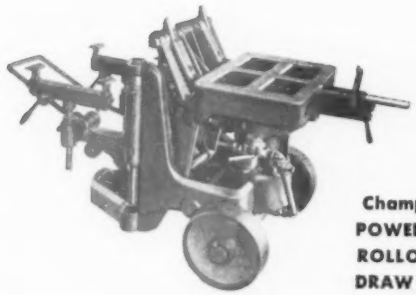


CB-15

CB-12



Champion Type JSL
JOLT SQUEEZE
PIN LIFT

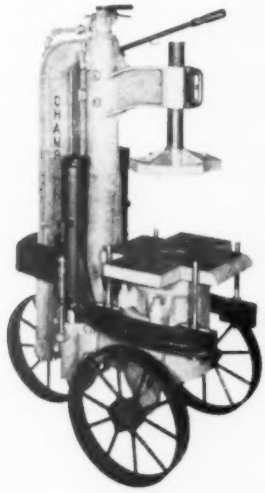


Champion Type JM
POWER JOLT, HAND
ROLLOVER AND
DRAW MACHINE

YOUR FOUNDRY

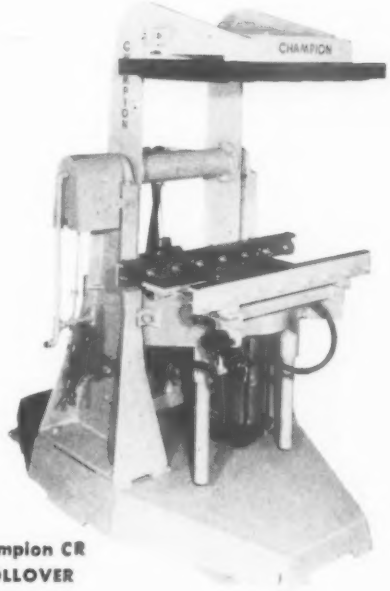
better castings at lower prices

Leading foundries that use Champion Core Blowers and molding machines to produce better castings at lower costs have the greatest possible sales advantage of marketing higher quality castings at lower prices. It'll pay you to Championize your foundry . . . to maintain full control over the quality and cost of your production.



Champion Type W.
HAND RAM, ROLLOVER
AND DRAW MACHINE

Champion Rollover and Draw Machines and Jolt Squeezers are designed to give you maximum service and efficiency. Let us show you how Champion equipment can fit perfectly into your foundry production picture.



Champion CR
ROLLOVER

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CHILE
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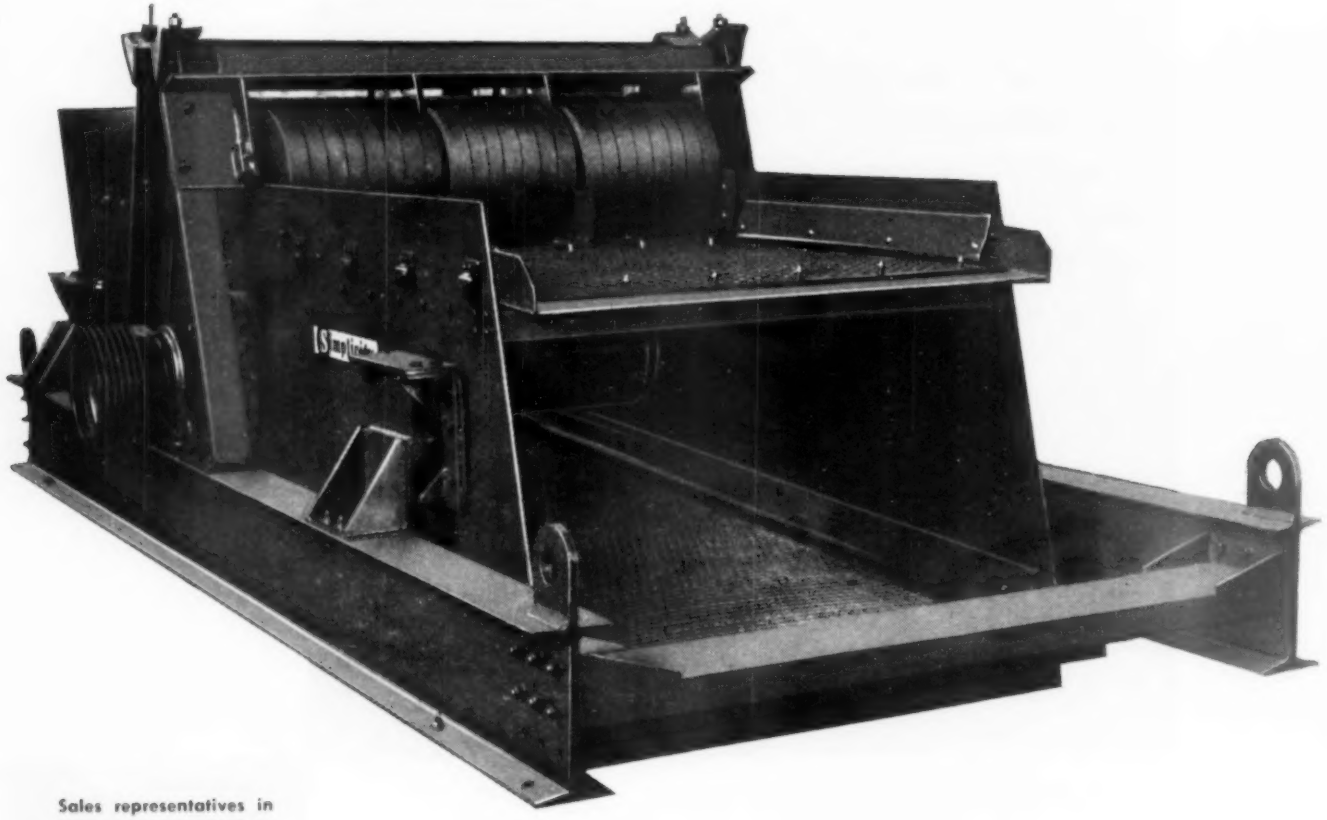
how one $5,000 crusher installation saved $30,000

Anyway you count it, $30,000 is a lot of money . . . especially for a $5,000 installation to save over a period of three years. But that's exactly the story behind one of the first Simplicity Ring Crushers that was installed in a large automotive foundry. During the first three years, the foundry management actually saved $30,000 in new sand purchases due to the effective job done by the Simplicity Crusher on usable sand recovery.

In another instance, also in an automotive foundry, two small Simplicity Crushers, a 2′ x 6′ and a 3′ x 8′, are making anticipated savings of $40,000 in good sand recovery, retrieved metal and eliminating of a disposal problem.

We believe we can save you money, too, with Simplicity equipment, and would appreciate the opportunity to sit down and talk over your plans and problems. There's a Simplicity sales engineer near you.



Sales representatives in all parts of the U.S.A.

FOR CANADA: Canadian Bridge Engineering Co., Ltd., Walkerville, Ontario.

FOR EXPORT: Brown & Sites, 50 Church St., New York 7, N. Y.

implicity

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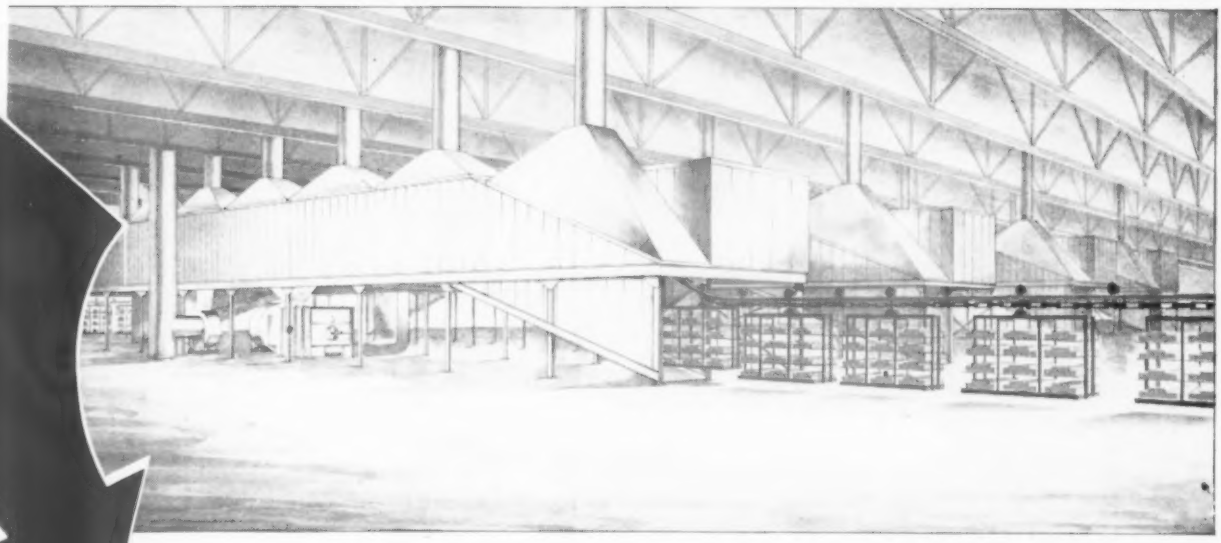
ENGINEERING CO. • DURAND, MICHIGAN

Here's Proof...

OF CARL-MAYER ACHIEVEMENTS IN FOUNDRY OVENS



Carl-Mayer Continuous Monorail Core Ovens
Patent No. 2,355,814

4 OF THE LARGEST CONTINUOUS CORE OVENS INSTALLED IN U.S.A. MADE FOR THE FORD MOTOR CO.

Each oven is 170 feet long, utilizing 1,200 feet of continuous monorail conveyor.

Some of the outstanding advantages of these ovens are—

(1) Flexibility in core handling, bench to core rack.
(2) Uniform, fast baking, using the "Mayer" convection heater.
(3) Cores can be removed with bare hands at unloading station using Carl-Mayer patented design.
(4) Smoke nuisance is eliminated.

Typical Users of CARL-MAYER VERTICAL AND MONORAIL OVENS

Aluminum Co. of America
Burt Foundry Co.
Cadillac Motor Co.
Eclipse Aviation Corp.
Electric Autolite Co.
Ford Motor Co.
Fremont Foundry Co.
General Motors Corp.
General Steel Castings Co.
Harrison Radiator Co.
Henry Kaiser
H. B. Salter Co.
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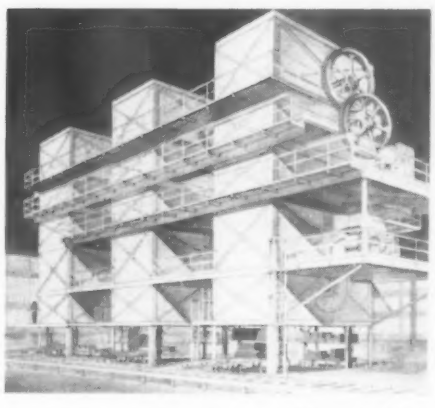


3 OUTSTANDING CARL-MAYER VERTICAL OVENS AT GENERAL STEEL CASTINGS CO.

Carl-Mayer Vertical Ovens use the universally adopted recirculating system with sealed combustion chamber located between the conveyor chains. It is the only oven design with the highly important new development of locating the heat fan inside of oven. Patent No. 2,257,180.

New added features are as follows:

(1) Saves platform space.
(2) Eliminating external duct reduces heat losses.
(3) Placing heat fan in oven also reduces heat losses, resulting in high operating efficiency.
(4) Elimination of external heat duct and fan insulation results in lower installation cost.
(5) Oven appearance is greatly improved and smoking eliminated from external heat ducts.

Write for full description of this and other vertical oven features guaranteeing faster baking, lower fuel consumption, smaller core losses, safer operation, elimination of smoke, cooled cores at unloading station, reduced labor cost.

THE CARL-MAYER CORPORATION

3030 Euclid Ave., Cleveland, Ohio

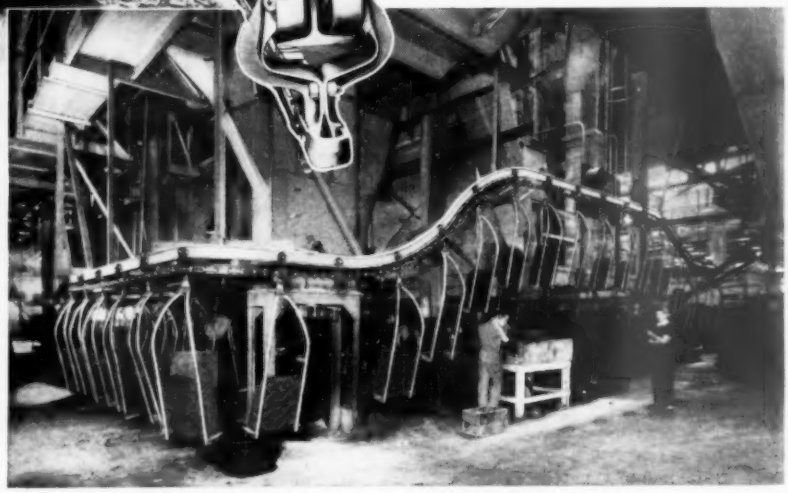
Core and Mold Ovens—all types. Backed by over 30 years' experience

—STRAIGHT—LINE—production—
from shakeout to the shipping room

. . . with LINK-BELT Overhead Trolley Conveyors

Malleable iron castings are carried from shakeout in perforated baskets suspended from Link-Belt Overhead Conveyors through cooling cycle.

Link-Belt Overhead Conveyor returning core plates from baking oven to core ramming machines.



Link-Belt Overhead Trolley Conveyors go up, down and around to furnish "straight-line" production in the foundry from beginning to end. For carrying castings from shakeout . . . to cooling . . . to cleaning . . . to shipping, foundrymen large and small use Link-Belt Overhead Trolley Conveyors. Cores, molds, sprue and other materials are also handled efficiently by this type of conveyor. For interesting facts about overhead conveyors write today for your copy of Book No. 2330.

LINK-BELT COMPANY

Chicago 9, Indianapolis 6, Philadelphia 40, Atlanta, Houston 1, Minneapolis 5, San Francisco 24, Los Angeles 33, Seattle 4, Toronto 8. Offices in Principal Cities.

12.062

LINK-BELT
OVERHEAD TROLLEY CONVEYORS

Rubber Bushed Portable Wheels

Among the many advantages of DS 8100 Rubber Bushed Organic Bonded (type 1) portable grinding wheels, three are particularly important in Foundry operations:

✓Higher Production Rates

These bushings dampen vibration. Operator fatigue is reduced. Wheel life is increased. Increased production results.

✓Increased Wheel Efficiency

Any tendency of the wheel to bounce, causing interruption of cutting rates, is minimized. Wheel to work contact time is increased and made more effective.

✓Easy and Proper Mounting

A steel liner holds the rubber bushing in place . . . provides metal-to-metal contact with the spindle.

The rapidly increasing popularity of these wheels has led to an increased wheel diameter range. 4″ to 10″ (inclusive) diameters are now available. Rubber washers must be used with rubber bushed portable wheels to obtain the benefit of the resilient bushing. Complete details may be obtained on request.

Bonded Products Division
THE CARBORUNDUM COMPANY
Niagara Falls, New York

BRANCH OFFICES IN:

Atlanta, Boston, Buffalo, Chicago, Cincinnati, Cleveland, Detroit, Los Angeles, Jersey City, Philadelphia, Pittsburgh, St. Louis, San Francisco

Bonded Abrasives by

CARBORUNDUM
TRADE MARK

Making ALL abrasive products . . . to give you the proper ONE

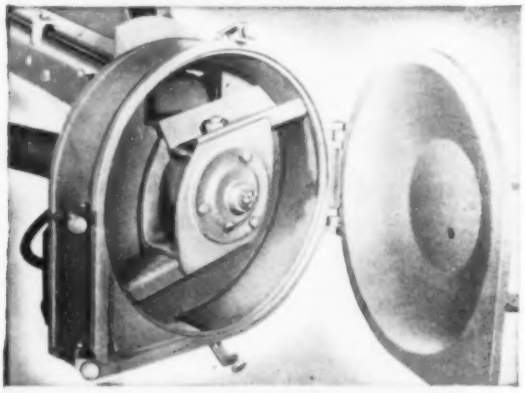
"Carborundum" is a registered trademark which indicates manufacture by The Carborundum Company

Now

Tabor offers these fine SANDRAMMERS

Featuring adjustable, multi-blade impellors for greater ramming speed and five-fold life.

New, Economical Impellor Head Design



Close-up of interior of Impellor Head. Note how blades are adjustable. This compensates for wear, giving blades a five-fold life over conventional-type impellor mechanisms. Also, *density* of mold can be controlled by blade adjustment. Mold is rammed at phenomenal speed, with equal density throughout the whole area and depth.

Here are two Sandrammers whose *low cost* will justify their use in foundries where such equipment formerly seemed prohibitive.

These machines handle a great range of mold sizes and depths. They are strong, efficient, precision-built. Trolleys and swivels are finely-balanced—ball-bearing mounted for effortless operation. Simple, sequence, push-button controls are at the operator's finger-tips. All mechanical and electrical working parts are fully-enclosed to keep out dust and dirt.

Both machines are so flexible, can produce so many high-quality molds, that molding costs can be reduced by as much as 50%.

The TABOR *Manufacturing Co.*

SINCE 1884 MANUFACTURERS OF FOUNDRY MOLDING MACHINES

6223 TACONY STREET • PHILADELPHIA 35, PENNA.

Tabor Manufacturing Co. is licensed to manufacture and sell Sandrammers by Foundry Equipment, Ltd., Leighton Buzzard, Bedfordshire, England.

Write, wire or 'phone.

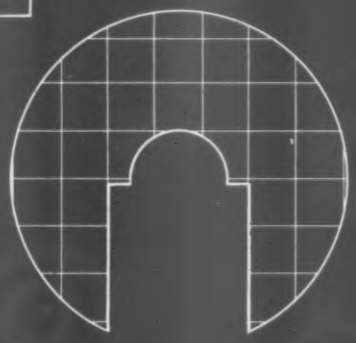
A TABOR ENGINEER WILL BE READY TO TEAM UP WITH YOU.

save labo

The "Junior" SANDRAMMER

The "Junior" is ideal for core room or small jobbing floor. It will quickly pay for itself in ramming up molds from loose patterns (always a headache), and for short-run core production. "Junior" also is capable of handling light to medium production work in both core room and foundry.

Has self-contained magnet in primary chute to remove metallic particles from sand. "Junior" is portable—can be moved by crane to molding areas, or mounted on rail car for along-track ramming. Adaptable to hand, hoist, or over-head system sand feeding.



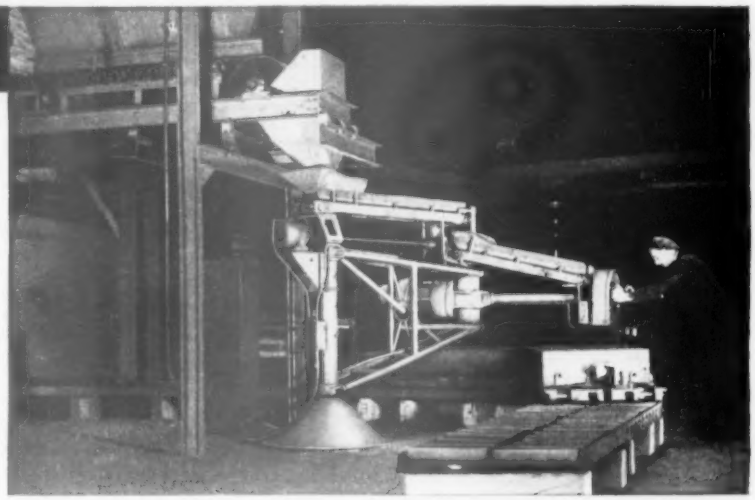
The blocked portion of this diagram shows working floor area covered by ramming head of "Junior" Sandrammer. Since each block represents one square foot, this sketch quickly tells you the combined maximum lengths and widths of molds which the "Junior" can handle.

"JUNIOR" SPECIFICATIONS

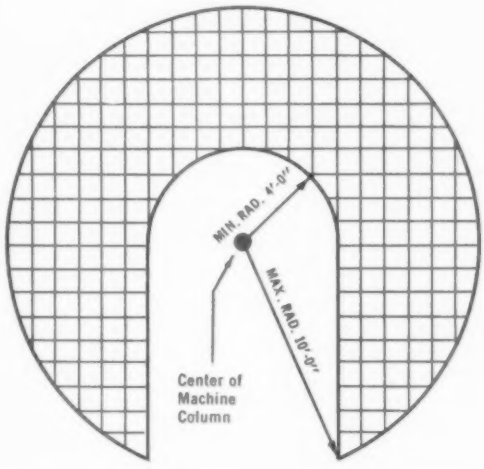
Height from floor to top of hopper	8'-8¾"
Height from floor to sand discharge point	2'-10½"
Max. height of flask	2'-9½"
Hopper capacity	675 lbs.
Sand throwing capacity	Up to 150 lbs. per minute

The SANDRAMMER

Sandrammer is a first-class production machine. It fits in well with heavy foundry floor work. In addition, Sandrammer finds many applications in the making of large cores, or in long-run core production service. It's highly flexible—lending itself to roller conveyor (as illustrated in the picture) or turntable arrangements.



A Sandrammer installed in a large automotive foundry.



The blocked portion of this diagram shows working floor area covered by ramming head of Sandrammer. Since each block represents one square foot, this sketch quickly tells you the combined maximum lengths and widths of molds which the Sandrammer can handle.

SANDRAMMER SPECIFICATIONS

Height from floor to top of feed chute	7'-0"
Height from floor to sand discharge point	3'-0"
Max. height of flask	2'-9"

(Sandrammer—being stationary—can be mounted on a raised concrete base, thus increasing maximum height of flask at no sacrifice to ramming efficiency.)

Sand throwing capacity	Up to 500 lbs. per minute

buy Tabor

MANUFACTURER'S ASSOCIATION, INC. FOUNDRY EQUIPMENT

New.... Improved

DELTA CORE & MOLD WASHES

SPEED PRODUCTION OF BETTER, CLEANER CASTINGS AT *Lower Cost*

Three easy-to-understand reasons why more foundries use DELTA Core and Mold Washes . . .

1. **MORE PERFECT CASTINGS . . .**
2. **LOWER CLEANING ROOM COSTS . . .**
3. **LESS SCRAP IN MACHINING.**

DELTA CORE AND MOLD WASH-BASE
Mix with silica flour and water to produce finished wash.

•

FOR STEEL
STEELKOAT — Special Core and Mold Wash.

•

FOR GRAY IRON AND MALLEABLE
Grakoat — Blackoat — Hi-temp.

•

FOR GRAY IRON
Blackoat S-5 — A new and different wash.

•

FOR NON-FERROUS METALS
Non-FerrusKoat.

•

FOR ALL SAND CAST METALS
THERMOKOAT — It's Plasti-Lastic.
PYROKOAT-HI-Speed.

•

FOR UNUSUALLY HIGH TEMPERATURE CONDITIONS
Z-KOAT — High-fusion-temp. Wash.

•

There is no "just as good" substitute for any DELTA Core and Mold Wash just as there is no substitute for DELTA'S scientific laboratory control of production which safeguards the quality and uniformity of all DELTA Foundry Products. DELTA Research laboratories developed, and pioneered the use of, Plastic-type Core and Mold Washes . . . and still leads the field in the development of new products for improved foundry practices.

NEW mechanical processing and improved chemical formulation . . . developed by DELTA Research . . . have resulted in many decided advancements in both the quality and characteristics of DELTA CORE and MOLD WASHES.

Maximum uniformity of surface coverage is obtained with lower Beaume mixes, using more water. Penetration characteristics are THREE times greater (from 10 to 12 grains deep) and the density of the wash on the surface has been increased 40%.

Due to increased surface density the rate heat conductivity is speeded up and metal in contact with the washed surfaces cools more rapidly, resulting in smoother casting finish.

HERE'S WHY

a. Delta Core and Mold Washes "Anchor" themselves by penetrating from 10 to 12 grains deep into the sand. This bond between the wash and the sand . . . a distinctive DELTA characteristic . . . produces an expansion-resisting coating essential to the production of finer finished castings.

b. The hot strength of Delta Core and Mold Washes increases with each degree of temperature rise from 1800°F to 3000°F providing maximum critical hot strength for all foundry applications.

The higher hot strength of DELTA Core and Mold Washes eliminates surface sand fissuring, excessive sand expansion and distortion.

c. No gas leakage through Delta Core and Mold washed surfaces. Gases produced by decomposition of organic binders in the core sand cannot leak through Delta Core and Mold washed surfaces to contact the molten metal. Only Delta Core and Mold Washes provide this unique and all-important insurance against defective castings resulting from core gas leakage. DELTA Core and Mold Washes insure more perfect castings with finer finished surfaces.

● *Ask for a liberal working sample. You will also receive complete data on how to use DELTA Core and Mold Washes in your foundry.*

DELTA OIL PRODUCTS CO.

MILWAUKEE 9, WISCONSIN

The executive who said: "Do each task as though your whole future depends on it" — comes pretty close to defining the secret of success. When one does each task as though his future depends on it he finds himself building a reputation for good work. Each new task is a challenge to excel. The task done well today sets off a chain reaction of future tasks done equally well . . . or better! All of us at *American* realize that our future is wrapped up in the way we do our work at the present moment.

OUR FUTURE IS WRAPPED UP IN THE PRESENT MOMENT

DUSTUBE TURNS A DUST NUISANCE INTO EXTRA PROFITS

for the Clark Metal Last Co., Mishawaka, Indiana

"DUSTUBE PAYS FOR ITSELF"

says

Mr. H. W. GILLIS, Mgr.

"With the Dustube all dust is effectively trapped where it returns a profit instead of committing a nuisance."

Large quantities of aluminum dust from grinding operations were escaping the existing dust collection system and creating an objectionable condition in the neighborhood. Dust permeating the atmosphere covered the building room and adjoining properties. Dustube engineers were called in and after surveying the grinding operations recommended a Dustube Collector system.

Removing the dust with virtually 100% efficiency, the Dustube put an end to all complaints. In addition, it proved a most profitable investment as it salvaged enough usable aluminum to pay its entire cost the first year of operation.

Savings like this often are made when a Dustube is installed. Let us prove that Dustube will save for you. Write today for details.

American WHEELABRATOR & EQUIPMENT CORP.

505 S. BYRKIT ST. MISHAWAKA 2, INDIANA

please turn page

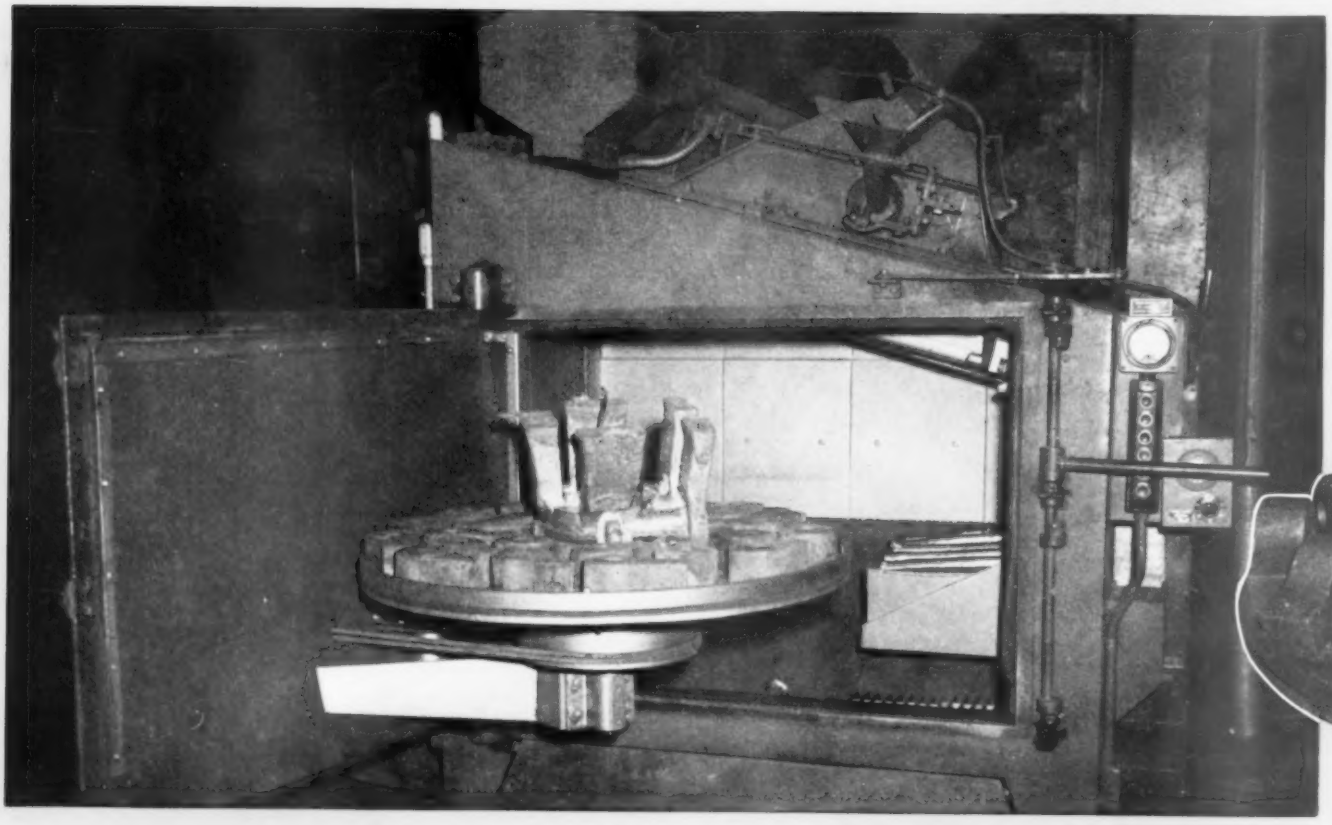
CASE HISTORY No. 21

WHEELABRATOR® SWING TABLE

COST COMPARISON CHART		
MACHINE USED	Tumbling Mills	48" Wheelabrator Swing Table
PRODUCTION	43 tons monthly	43 tons monthly
LABOR REQUIREMENTS	69 man hours per net ton including chipping and grinding.	51 man hours per net ton including chipping and grinding.
COST PER TON	$45.00	$36.00

SAVING Per Ton $9.00 Per Month $387.00 Per Year $4,644.00

The Wheelabrator Swing Table cleans loads of 1000 pounds in only 3 minutes at a Canadian Steel Foundry.



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MANUFACTURING LICENSEES for Continental Europe: George Fischer, Ltd., Schaffhausen, Switzerland; for British Empire, excluding Canada: Tilghman's Patent Sand Blast Co., Ltd. Broadheath, Nr. Manchester, England. SALES REPRESENTATIVES: Brazil— Equipamentos Industriais "Eisa" Ltda.; Argentina — Clarfix S. R. L.; Mexico — Casco, S. De. R. L.; Puerto Rico — Agent Cobiella.

American

SAVES $4644.00 per year

for a Canadian Steel Foundry

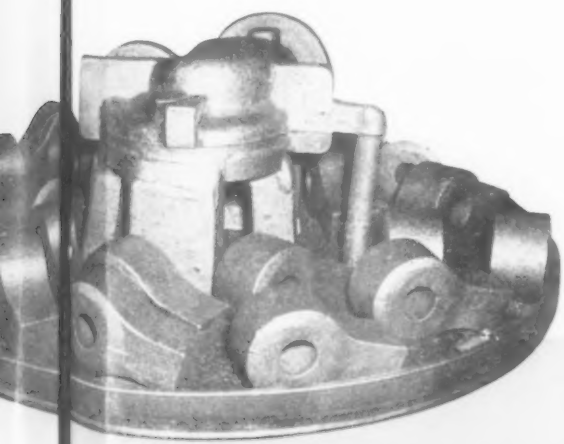
WINS NEW CUSTOMERS DUE TO CLEANER CASTINGS ELIMINATES NEED FOR NEW COMPRESSOR

The importance of the cleaning room to the profitable operation of a foundry cannot be overestimated. For instance, at a Canadian steel foundry, thousands of dollars and many orders were lost yearly because of inadequate cleaning equipment. The cleaning room was always days behind and the quality of cleaning was not up to par. Tumbling mills, excessive manual grinding and chipping proved a costly method of cleaning their production of steel castings. In order to continue using this equipment a new compressor was needed because of an insufficient air supply for the chipping hammers.

With the installation of a Wheelabrator Swing Table, it was possible to eliminate four chippers and grinders. The saving in air pressure has made it unnecessary to install a new compressor. Eighteen man hours have been saved on every ton of good castings produced. This means a saving of $387.00 per month on an average production of 43 tons — enough to pay the entire cost of the machine in less than two years.

Even more important is the new business obtained due to the thoroughness of Wheelabrator cleaning. Customers are now given prompt service, as the previous day's cast is cleaned by noon.

Your cleaning costs may be higher than you think. Let Wheelabrator Engineers show you how much you can save when you use the right equipment. Write today for details.



WORLD'S LARGEST BUILDERS OF AIRLESS BLAST EQUIPMENT

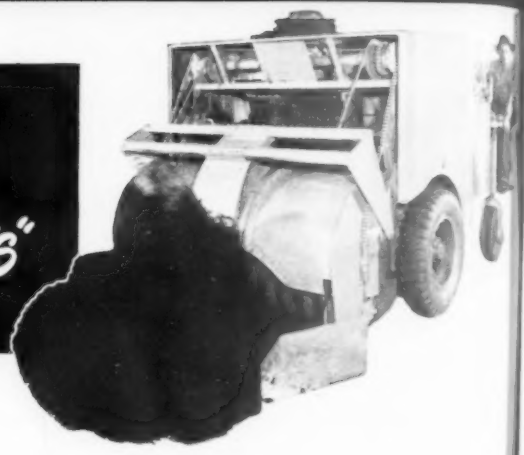
WHEELABRATOR & EQUIPMENT CORP., 505 South Byrkit Street Mishawaka 2, Indiana

MEMBER FEMA

please turn page

FIRST SANDMASTER INSTALLED BRINGS "EXCEPTIONAL, ALMOST AMAZING RESULTS"

at the Zenith Foundry CO., West Allis, Wisconsin



American Wheelabrator & Equipment Corp.
Mishawaka, Indiana

Gentlemen:

We have had such exceptional, almost amazing results with the American Sandmaster that we want to pass on to you our experience with this new, better method of sand conditioning.

Our foundry, while not large, has earned an enviable reputation for quality gray iron castings. We are very happy with the improved appearance of the castings we are now producing for our customers — the secret for which can be found in the soft, fluffy well conditioned molding sand.

The Sandmaster provides certain benefits that cannot be obtained with any other sand conditioning equipment, regardless of price, namely:

(1) *Removal of Tramp Iron.* The first night we used the Sandmaster more than 150 pounds of metal were removed from one sand heap measuring about 30' in length and 60" in width at the base. We estimate that decreased scrap losses alone will enable us to pay for the unit in a few years operation.

(2) *Screening.* Particles of coke, charcoal, cores, etc. are effectively removed from the sand heaps in one pass through the sand.

(3) *Better Sand Quality.* The mulling action of the Sandmaster gives a superior quality to our sand. We have been able to reduce the amount of bond used 50% which is another enjoyable saving.

As you can gather from the above we are very well pleased with the Sandmaster. From our experience with this new unit we are satisfied that the Sandmaster incorporates all the design and operating features necessary for fast, complete sand conditioning.

Very truly yours,
ZENITH FOUNDRY COMPANY

wrt/mb

W. R. Tanner, President

ONLY SANDMASTER GIVES YOU ALL THESE ADVANTAGES

BETTER SAND QUALITY

The improved cutting cylinder of the new Sandmaster imparts a mulling action to the Sand, giving it a superior quality.

MAGNETIC SEPARATION

A high efficiency magnetic separator removes all sizes of shot and tramp iron before screening.

SCREENING

Particles of coke, cores, gaggers, etc., usually present in any sand heap, are effectively removed. Screening also opens up, fluffs, aerates and cools the hot sands, permitting gases to escape.

PILING

After conditioning, the entire heap can be piled beside the molding machine or between benches.

To give your sand the "Velvet Feel" investigate the new Sandmaster today. Write for Bulletin No. 45.

TRU-STEEL* Shot Lasts *Six Times* Longer

Saves 28.24 lbs. of abrasive per wheel hour

By replacing chilled iron shot with TRU-STEEL, a Pennsylvania gray iron foundry saved 60% on the cost of abrasive used in a 36"x42" Wheelabrator Tumblast. During a test period of 201 wheel hours, only 5 lbs. of TRU-STEEL Shot were consumed per wheel hour compared to 33.24 lbs. with chilled iron shot.

*TRU-STEEL SHOT is manufactured by Steel Shot Producers, Inc., Butler, Pa.

COST COMPARISON CHART

	CHILLED IRON	TRU-STEEL
Shot used	3124 lbs. (32.24 lbs.) per wheel hr.	535 lbs. (5 lbs.) per wheel hr.
Cost of shot	$156.20	$64.20

SAVING (107 wheel hours) $92.00

please turn page

American WHEELABRATOR & EQUIPMENT CORP. 505 S. Byrkit St., Mishawaka, Ind.

38 YEARS AGO THIS FOUNDRY FOUND THE ANSWER

Well-known producer relies on U. S. Rubber to keep down grinding wheel costs

HOW TO MAINTAIN production while keeping grinding costs down? Today that's a major problem. Back in 1912 a leading malleable iron foundry was faced with the same problem, and the management found the answer by turning to U. S. Rubber—the abrasives experts since 1863.

THE FOUNDRY MEN knew that "U. S." had research facilities which not only thoroughly covered abrasives and bonds, but also extended into all the fields covered by the many products of United States Rubber Company.

THE FOUNDRY picked U. S. Wheels and has been using them ever since. Whether you're snagging castings or grinding ball races, there's a U. S. Royalite Wheel engineered precisely to the job—carefully tested in both factory and laboratory.

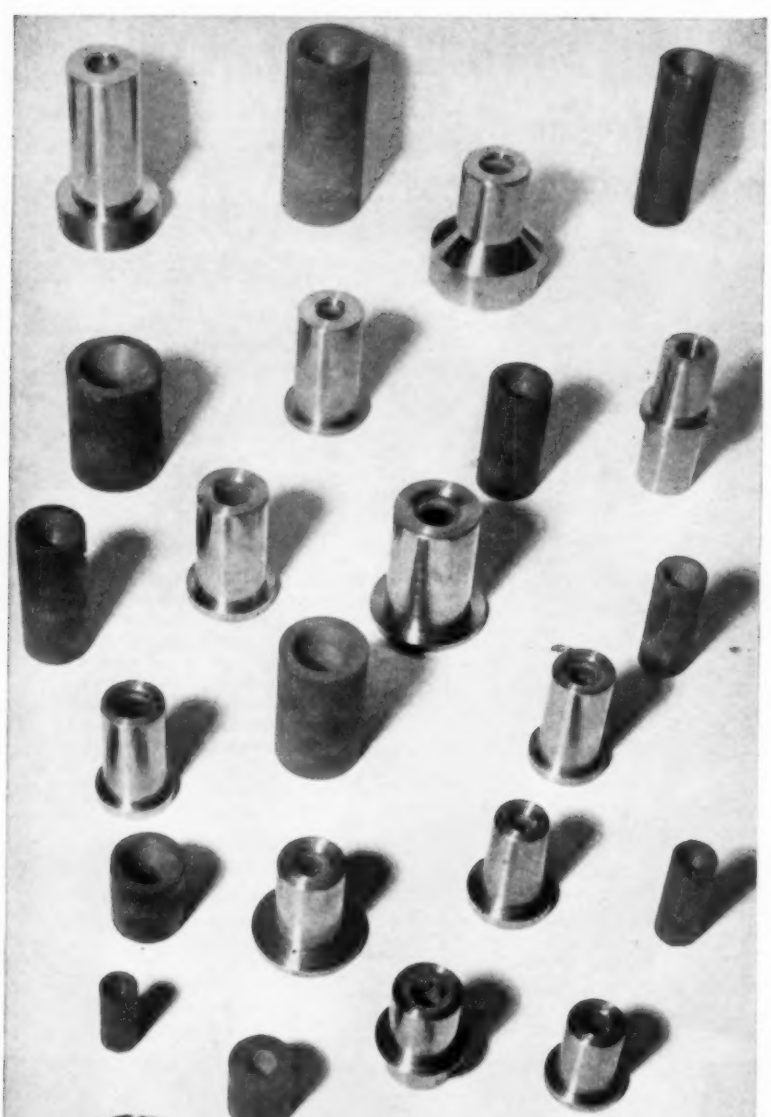
For your own particular needs, you can obtain in advance accurate grinding costs with U. S. Royalite Wheels from one of our trained field engineers, who will make thorough tests right in your own plant. Write to:

A PRODUCT OF

U.S.RUBBER
SERVING THROUGH SCIENCE

UNITED STATES RUBBER COMPANY

MECHANICAL GOODS DIVISION, ROCKEFELLER CENTER, NEW YORK 20, N. Y.



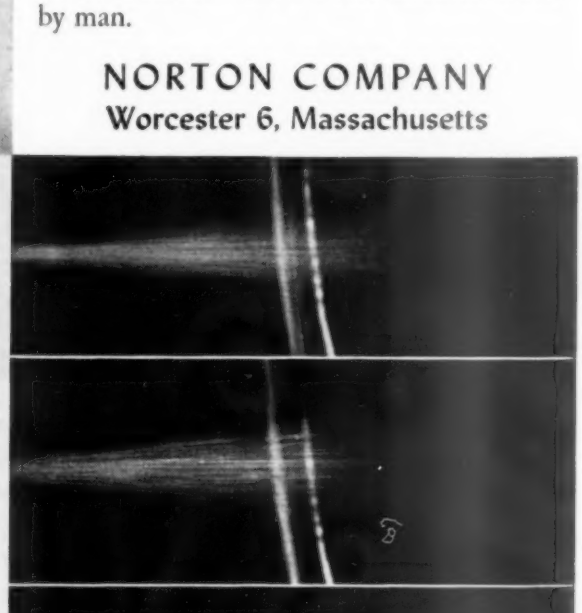
For Savings and Service
NORBIDE® *Blast Nozzles*

HERE ARE THREE GOOD REASONS why it pays to purchase NORBIDE pressure blast nozzles:

1. They give more service per dollar cost than any nozzle now available—guaranteed to give 750 hours with silica sand and 1,500 hours with steel grit before the orifice diameter enlarges one and one-half times. One NORBIDE nozzle will often outwear 1,000 iron ones.
2. The wear-resistance of NORBIDE nozzles decreases air consumption from 10% to 20% as compared with iron nozzles because the nozzle retains its original orifice for a long period of service.
3. NORBIDE nozzles increase production and improve blasting efficiency. Time is *not* lost for frequent changes of worn-out nozzles. And because the nozzle orifice is not readily worn larger, abrasive velocity remains more uniform with the maximum of cleaning efficiency and economy.

NORBIDE nozzles are made of Norton Boron Carbide—the hardest material made by man.

NORTON COMPANY
Worcester 6, Massachusetts



High-speed photograph of stream from new iron nozzle—note that stream concentration and abrasive velocity and volume are fair

Stream from the same nozzle after three hours with silica sand. Outlet opening worn to twice original size—stream concentration poor, abrasive velocity and volume low

Stream from Norbide Nozzle after 404 hours with sand—outlet diameter worn only 0.032"—hundreds of hours of useful life remain—marked stream concentration—high abrasive velocity and volume

Good Foundries . . .

for GOOD reasons

Specific reasons why the leading foundries listed below are good places to work, have been given in a series of ads beginning in February, 1948.

Company names are shown herewith to emphasize again that these, and many other foundries are using Herman Molding Machines to help them maintain their reputations for efficiency in the production of quality castings.

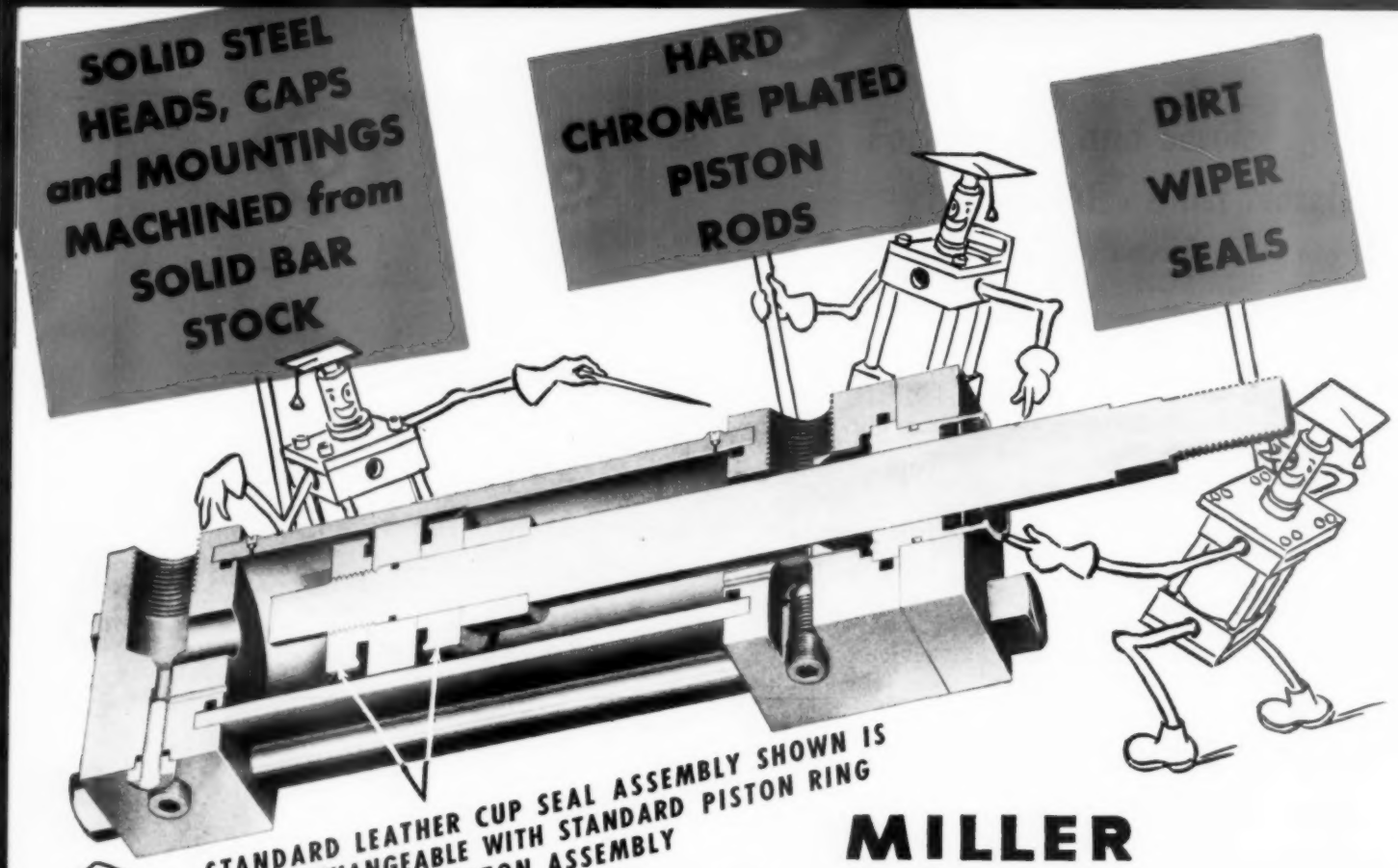
Herman Molding Machines have made their way by the way they're made.

Link Belt Company
Chicago, Ill.
Cincinnati Milling Machine Co.
Cincinnati, Ohio
Lynchburg Foundry Company
Lynchburg, Va.
Whitin Machine Works
Whitinsville, Mass.
Chicago Pneumatic Tool Co.
Chicago, Ill.
Urick Foundry Co.
Erie, Pa.
Lebanon Steel Foundry
Lebanon, Pa.
H. P. Deuscher Company
Hamilton, Ohio
Sterling Foundry Company
Wellington, Ohio
Maynard Electric Steel Casting Co.
Milwaukee, Wisc.
West Yorkshire Foundries, Ltd.
Leeds, England
Lake City Malleable, Inc.
Ashtabula, Ohio
Scullin Steel Co.
St. Louis, Mo.

Aluminum Company of America
Cleveland, Ohio
The Pacific Car and Foundry Co.
Renton, Wash.
Howard Foundry Co.
Chicago, Ill.
The Dow Chemical Company
Bay City, Mich.
American Brake Shoe Co.
Toledo, Ohio
Birdsboro Steel Foundry & Machine Co.
Birdsboro, Pa.
Hills-McCanna Company
Chicago, Ill.
Worthington Pump & Machinery Corp.
Harrison, N. J.
American Steel Foundries
Newark, N. J.
Beloit Iron Works
Beloit, Wisc.
Continental Foundry & Machine Co.
Coraopolis, Pa.
The Cooper Alloy Foundry Co.
Hillside, N. J.
The Westinghouse Air Brake Co.
Wilmerding, Pa.

Herman **MOLDING MACHINES**

HERMAN PNEUMATIC MACHINE CO., UNION BANK BUILDING, PITTSBURGH, PA.



STANDARD LEATHER CUP SEAL ASSEMBLY SHOWN IS INTERCHANGEABLE WITH STANDARD PISTON RING PISTON ASSEMBLY

MILLER *High Pressure* HYDRAULIC CYLINDERS

Meet J. I. C. HYDRAULIC STANDARDS

Years before the Joint Industry Conference (J. I. C.) Standards for specifying "quality" hydraulic equipment were adopted, the *standard* design and construction features of Miller High Pressure Hydraulic (2000-3500 psi) Cylinders already included ALL the specifications for cylinders, seals and pistons now called for by the "Standards". Hard chrome plated, scratch-resistant piston rods and dirt wipers have long been standard Miller cylinder features yet are required by the "Standards" only under severe conditions.

Solid steel heads, caps and mountings which eliminate costly, dangerous breakage even under the severest operating conditions represent an "extra-quality" standard Miller cylinder feature which actually exceeds the high quality set by the J. I. C. Standards.

The Miller "Patented" Hydraulic Piston Rod Seal which has no manual adjustment and is automatically self-adjusting and wear-compensating to give life-long leakproof service without ever requiring any manual adjustment whatsoever . . . far surpasses the requirement of J. I. C. Standard H6.2.5 which specifies "Stuffing boxes for automatic packing shall be so designed as to prevent adjustment beyond the functional limits of the packing"

Benefits to You

No Broken Castings

No Scratch-Damage to Piston Rods, Bushings and Seals

NO COSTLY "DOWNTIME"
NO REPAIRS
NO MAINTENANCE
NO POWER WASTAGE

Write for illustrated cylinder bulletins A-105 and H-104

COMPLETE MILLER CYLINDER LINE INCLUDES: AIR CYLINDERS, 1½" to 20" BORES, 200 PSI OPERATION; LOW PRESSURE HYDRAULIC CYLINDERS, 1½" TO 6" BORES FOR 500 PSI OPERATION, 8" TO 14" BORES FOR 250 PSI; HIGH PRESSURE HYDRAULIC CYLINDERS, 1½" TO 12" BORES, 2000-3000 PSI OPERATION. ALL MOUNTING STYLES AVAILABLE.

MILLER MOTOR COMPANY

4025-33 N. KEDZIE AVENUE • CHICAGO 18, ILLINOIS

AIR AND HYDRAULIC CYLINDERS · ACCUMULATORS · COUNTERBALANCE CYLINDERS · BOOSTERS · AIR HOISTS

CLEVELAND — PITTSBURGH — PHILADELPHIA — DETROIT — YOUNGSTOWN — BOSTON
HARTFORD — NEW YORK CITY — DAYTON — ST. PAUL — FORT WAYNE — INDIANAPOLIS
MILWAUKEE — NASHVILLE — SEATTLE — LOS ANGELES — SAN FRANCISCO — BALTIMORE
ST. LOUIS and OTHER AREAS.

Sales and Service from coast to coast

$125 and 7 weeks saved, thanks to NI-ROD repair of cast iron speed reducer

When a mishap all but destroyed a vital coil-vat speed reducer, maintenance men of the M & R Dietetic Laboratories were faced with a serious problem.

A new speed reducer cost 135 dollars and would take 8 weeks to be delivered. Repairing the unit would require only a week, but the damage was so extensive that success seemed doubtful. Yet, there was so much to be gained that they decided to take the gamble.

The shattered speed reducer was sent to M & R's welding shop, where . . . using Ni-Rod® electrodes . . . their welding technicians succeeded in assembling the broken pieces.

The cost of the repair, including labor, was only 10 dollars, and the time required was 1 week. *This represented a net saving of 125 dollars and 7 weeks down time. A highly profitable operation, indeed!*

Experiences such as this . . . of time and money saved in welding cast iron with Ni-Rod electrodes . . . are daily occurrences at thousands of welding shops throughout the nation. The reason for Ni-Rod's popularity with these experienced welders is *dependability*. With Ni-Rod electrodes you get quick, sound, machinable welds in all grades of cast iron . . . usually without preheating or postheating. Ni-Rod works well in all positions; can be used with either AC or DC current.

The best way to find out about Ni-Rod's many advantages is to try it. Order a package today and discover for yourself why *4 out of 5 shops* re-order Ni-Rod, once they have tried it.

Your nearest INCO distributor stocks Ni-Rod in 3/32", 1/8", 5/32", and 3/16" diameters.

Coil-vat speed reducer repaired with Ni-Rod at M & R Dietetic Laboratories, Columbus, Ohio.

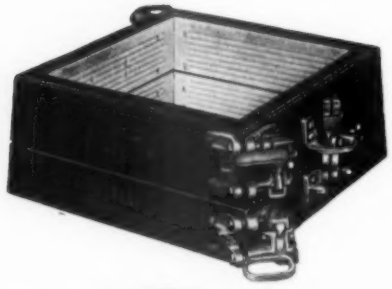
For welds you've never been able to make before . . . in high-phosphorous irons; heavy sections—

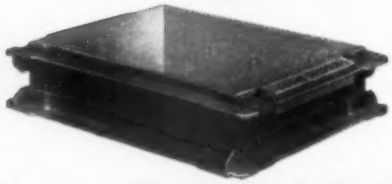
NI-ROD "55"

THE INTERNATIONAL NICKEL COMPANY, INC.
67 Wall Street, New York 5, N. Y.

THE WINNING COMBINATION

10" Post Type
Universal
Jolt Squeezer
Portable Type





ADAMS UNIVERSAL JOLT SQUEEZERS

EQUALLY efficient as jolt-squeeze-pattern-draw machines or plain jolt squeezers, these simply designed production units will reduce production costs and minimize rejects. Their operation is so simple and easy that no special skill is required to maintain uninterrupted high production levels. Available in both post and side rod types, stationary and portable.

ADAMS CUSTOM-BUILT FLASK EQUIPMENT

When you use Adams Flask Equipment you are assured the superior performance that means peak production. Adams Cherry Slip Flasks or Cherry Snap Flasks used with Adams Cast Iron, Aluminum or Steel Jackets are a combination hard to beat for accuracy, convenience and economy. Remember — all Adams Flask Equipment is made by experienced craftsmen to your exact specifications.

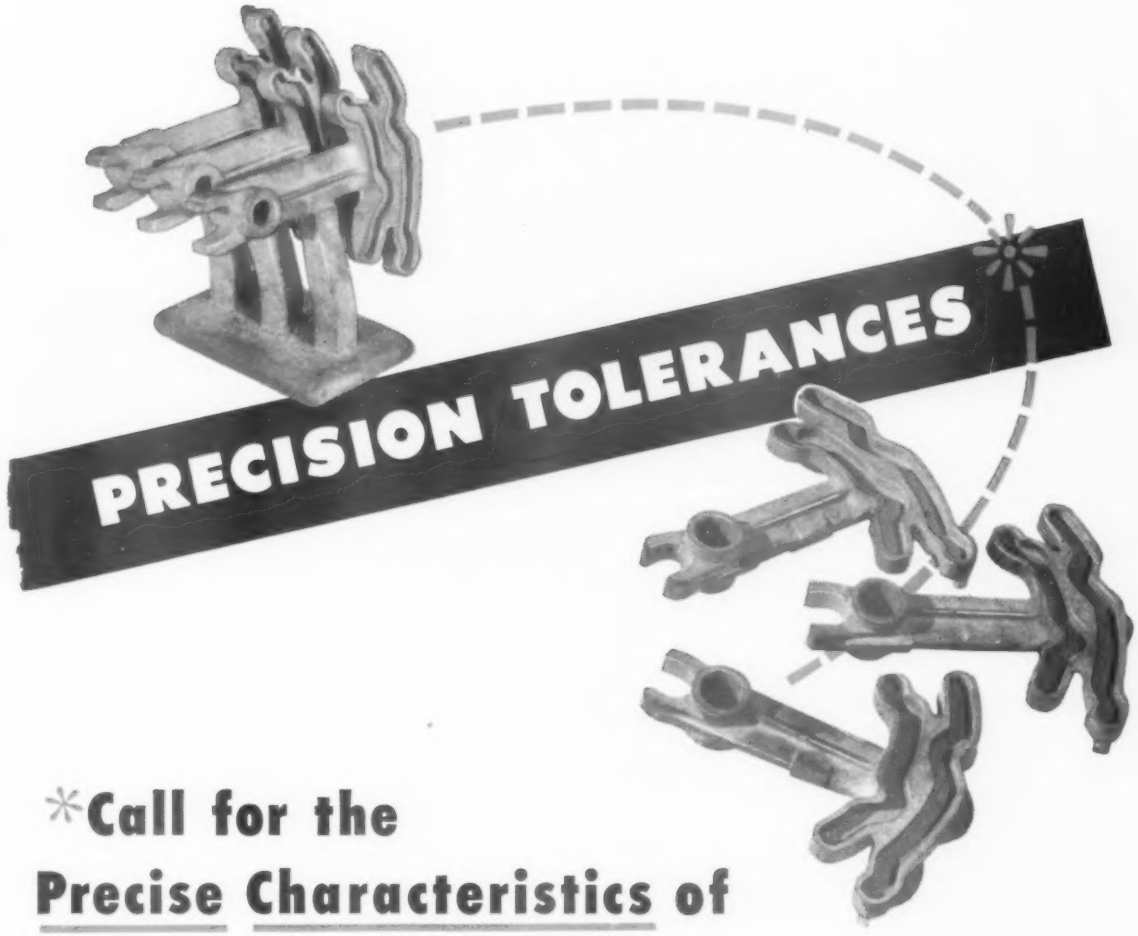
WRITE FOR descriptive literature detailing the production-boosting features of Adams foundry equipment line. THE ADAMS COMPANY, 800 Foster St., Dubuque, Iowa.

The ADAMS Company

ESTABLISHED 1883

MOLDING MACHINES and FLASK EQUIPMENT

DUBUQUE, IOWA, U.S.A.



*Call for the Precise Characteristics of CHATEAUGAY PIG IRON

Typical of countless precision casting applications for CHATEAUGAY Pig Iron, are these alloy steel cam guides used by one of America's leading cycle manufacturers. Why? Because CHATEAUGAY—Republic's exclusive low phosphorous, copper-free pig iron—consistently assures predetermined results in every casting job, large or small.

In these parts, for example, tolerances on the camway must be held to .002" in order that machining costs may be kept to a minimum. Camway surfaces must be hard and resistant to wear . . . and the entire casting must be sound and strong throughout. Wherever it is used, CHATEAUGAY provides all of these qualities *and more.*

Consistently uniform "physicals" within narrow specified limits . . . uniformly fine grain structure . . . fast-flowing and even-cooling characteristics . . . high impact value . . . unsurpassed machinability . . . all are excellent reasons why you, too, should investigate the cost-saving advantages of CHATEAUGAY Pig Iron. A Republic Pig Iron Metallurgist will be glad to give you all the facts at your convenience.

REPUBLIC STEEL CORPORATION
GENERAL OFFICES • CLEVELAND 1, OHIO
Export Department: Chrysler Building, New York 17, New York

Republic PIG IRON

"CHATEAUGAY"	"REPUBLIC"	"PIONEER"
Low-Phosphorus, Copper-Free	(Northern) Foundry, Basic and Malleable	(Southern) Foundry and Basic

REPUBLIC STEEL

COLEMAN OVENS

BAKE CORES AT LOWER COST

— than any other known method! —

● Cores are made only to be destroyed in serving their purpose in the production of good castings. Therefore the method that produces all the perfect cores you need at the lowest possible cost is the best method to use. No other method can produce cores at lower cost than Coleman Ovens because only Coleman Ovens enable you to combine all these advantages for the greatest overall economy:

...the GREATEST FUEL SAVINGS by using the most economical fuel available.

...the GREATEST SAVINGS IN LABOR resulting from the most efficient handling methods for *your* production.

...the USE OF MOST SATISFACTORY BINDERS for your particular casting requirements—oil or resin.

...the MOST EFFICIENT USE of your available production floor space.

...the FINEST AND MOST DEPENDABLE BAKING METHOD to eliminate rejects and make-overs.

...the LOWEST MAINTENANCE COST for up-keep and service.

COLEMAN OVENS can assure you of these results because they are proven through over 10,000 Coleman Oven installations. No other method can furnish you with an equal record of efficiency or dependability!

For information on Coleman Ovens to meet your needs, write for Bulletin 48 today.

COLEMAN TRANSRACK OVENS
at Crucible Steel Castings Co.

For use with portable racks to reduce handling labor. Designed to provide maximum flexibility of core sizes and shapes for jobbing shop requirements.

COLEMAN OVENS are built in a complete range of sizes and capacities for every core-baking and mold drying requirement: Tower Ovens, Horizontal Conveyor Ovens, Car-Type Ovens, Transrack Ovens, Rolling Drawer Ovens, Portable Core Ovens, Portable Mold Dryers, etc.

WORLD'S OLDEST AND LARGEST FOUNDRY OVEN SPECIALISTS

THE FOUNDRY EQUIPMENT COMPANY

MEMBER FEMA

1831 COLUMBUS ROAD **CLEVELAND 13, OHIO**

Harbison-Walker

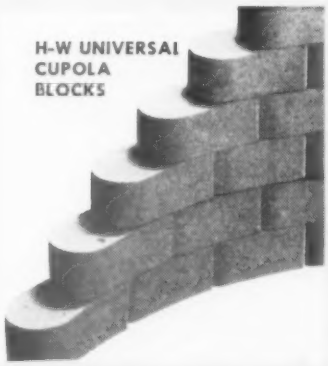
specialized FOUNDRY *refractories*

help you reduce costs and improve your castings

CUPOLA REFRACTORIES

In cupola operation, the nature of the charge, method of charging, character of flux, use of inoculators, ash content of fuel and melting conditions, all influence the proper choice of refractories. Harbison-Walker provides a variety of specialized refractories for cupolas from which the types and brands best suited to the particular service may be selected. These include Tap-Out and Slag-Hole Blocks, patching and ramming materials and mortars.

In addition to the manufacture of the full complement of conventional brick shapes and cupola blocks, Harbison-Walker introduced the H-W Universal Cupola Blocks. By their use, joint erosion is much reduced and the need for stocks of more than one size of radial block is obviated because the Universal block fits any cupola diameter.



H-W UNIVERSAL CUPOLA BLOCKS

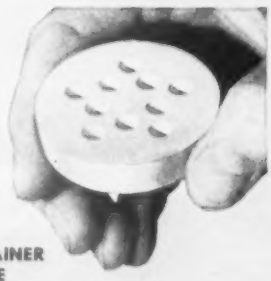
MOULD REFRACTORIES

The use of Harbison-Walker Gate and Runner Brick greatly reduces difficulties caused by sand inclusions in castings. Gate and Runner Brick sizes of 1½" bore and larger are available.

Harbison-Walker Refractory Strainer Core Shapes reduce rejects and contribute to greater foundry efficiency through the elimination of slag and strainer core sand inclusions. Made of a hard, strong, ceramic material, they do not spall or erode during pouring. Seven sizes are regularly furnished.

Harbison-Walker Breaker Core Shapes placed in the flask provide necked-down risers without core boxes, patterns or baking. They save time and money in the foundry cleaning room where riser bodies are removed from castings.

In the production of heavy castings, the bonding strength and refractoriness of moulds must be maintained for relatively long times and at high temperatures. For this service, Harbison-Walker provides Moldsand Bond and the highly refractory moulding medium, Calamo.



STRAINER CORE SHAPES

BREAKER CORE SHAPES

LADLE REFRACTORIES

For the lining of mixing, receiving and holding ladles, Harbison-Walker high-fired super-duty fireclay brick, high duty fireclay brick or plastic fire brick may be used. Harbison-Walker Insulating Fire Brick are used as backing. Large pouring and transfer ladles usually have refractory brick linings, and the smaller have monolithic refractory, with bottoms of fireclay brick.

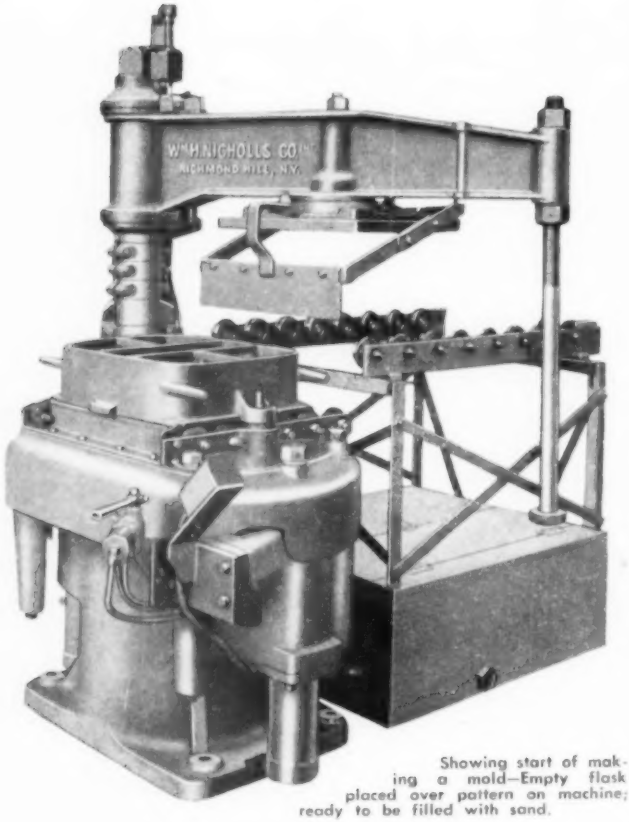
Harbison-Walker offers a complete range of shapes, refractory plastics, ganister, clays, sleeves and bonding mortars for foundry ladle service.

Harbison-Walker Technical Service will gladly help you select the materials that will best serve your particular requirements.

HARBISON-WALKER REFRACTORIES COMPANY
AND SUBSIDIARIES
WORLD'S LARGEST PRODUCER OF REFRACTORIES
GENERAL OFFICES • PITTSBURGH 22, PA.

HEAVY DUTY MOLDING and PATTERN DRAW.... [redacted] *for fully automatic*

HEAVY DUTY Combination Jolt and Power Squeezer Molding Machines with pneumatic pattern draw and power operated self positioning parallel squeeze head, equipped with electrical controls for single push button automatic operation of jolt, squeeze, pattern draw and cross arm, including automatic sand strike-off, mold pusher and adjustable flask roll-off device.



Showing start of making a mold—Empty flask placed over pattern on machine; ready to be filled with sand.

PRECISION BUILT Pistons and cylinders are finished ground to micrometer sizes. This operation also closes the pores and obviates any danger of rapid wear from dust films present in outmoded smooth turning.

All draw pins and guide bushings are case hardened and ground to precision tolerances for perfect fit and smooth operation. An accurate system of gages and jigs provides interchangeability of parts for the same models.

Flask has been filled with sand, jolted and is shown being released after the squeezing operation in preparation for the pattern draw.

LOW UPKEEP The low upkeep records of hundreds of foundries attest the foresight of Nicholl's Engineers in designing inbuilt features that make for long life and accurate, dependable performance after years of service. As an instance, we point to the dirt-proof housings and forced lubrication that are provided for all critical parts that might otherwise wear quickly and affect permanent alignment and satisfactory operation.

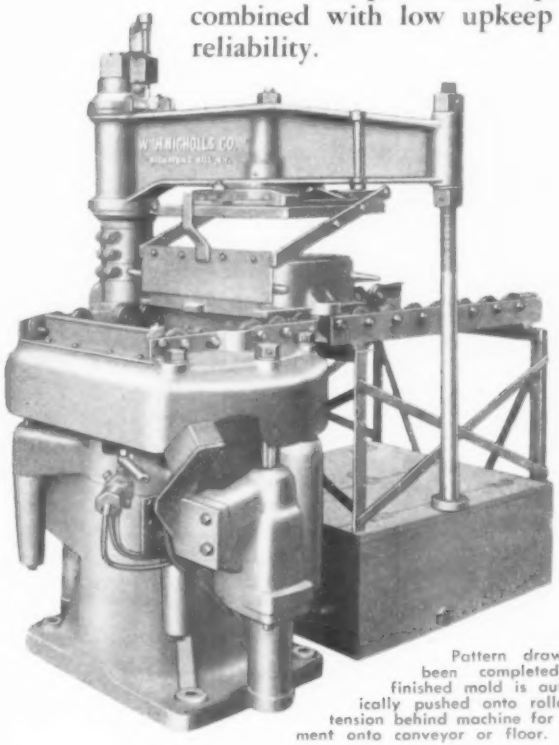
SENSITIVE OPERATION The use of skilled mechanics aided by an accurate system of gages and jigs, assure precision machining and grinding of parts to proper tolerances. Hence the machines are sensitive to the slightest touch of the controls.

MACHINES . . . JOLT SQUEEZE

Equipped with Single Push Button operation ★ Adaptable to all sizes of machines

10 SECONDS
—Complete cycle for making a mold—with 4 jolt strokes

The international acceptance of large numbers of Nicholls molding machines for many years is evidence of their productive capacity, combined with low upkeep and reliability.



Pattern draw has been completed and finished mold is automatically pushed onto roller extension behind machine for placement onto conveyor or floor.

GUARANTEED WORKMANSHIP

Smooth, sensitive operation is built into all moving parts of Nicholl's Molding Machines by expert mechanics skilled in their specialized tasks. Close tolerances are made possible by a system of accurate jigs and fixtures.

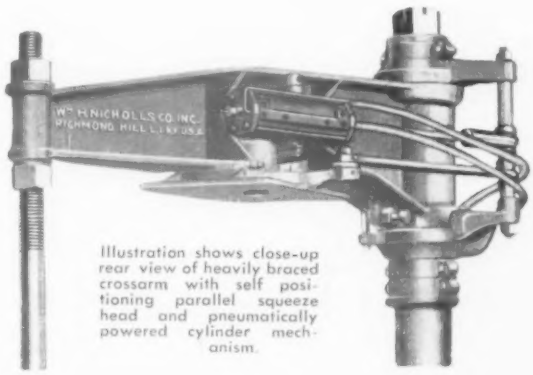


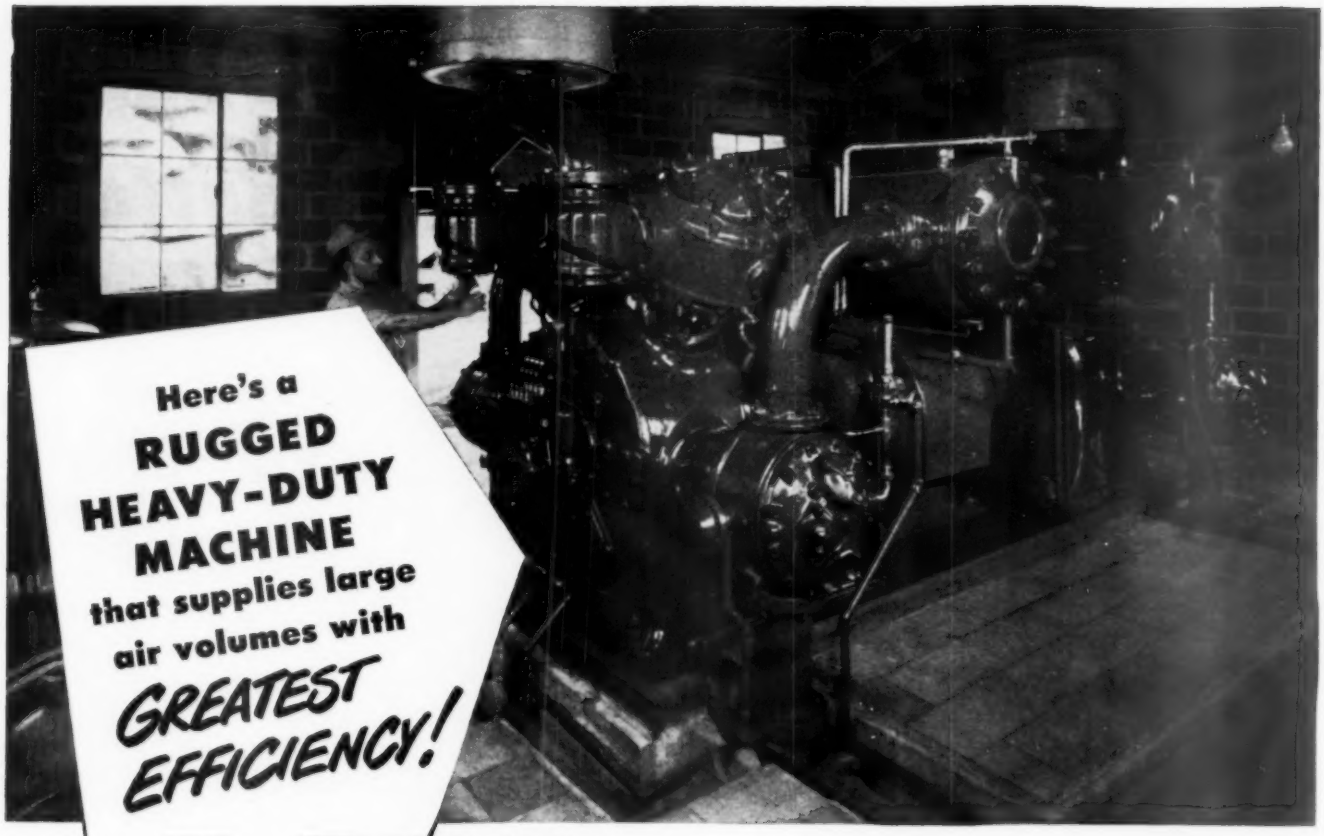
Illustration shows close-up rear view of heavily braced crossarm with self positioning parallel squeeze head and pneumatically powered cylinder mechanism.

MODERN MATERIALS The materials selected for components are alloys best suited for each part, and the decisions have been based on research and the advice of metallurgists. High tensile and transverse strengths provide ample factors of safety at critical points to offset stresses subject to jolting and squeezing.

Wm. H. NICHOLLS Co., Inc.
RICHMOND HILL, LONG ISLAND, NEW YORK

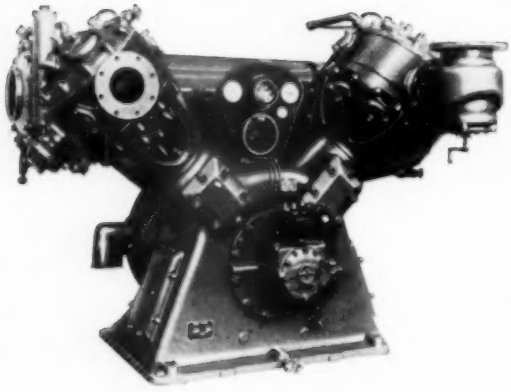
Foreign Manufacturers and Selling Agents—
For Continental Europe and Great Britain — The George Fischer Steel and Iron Works, Schaffhausen, Switzerland.

NICHOLLS



Here's a
RUGGED HEAVY-DUTY MACHINE
that supplies large air volumes with
GREATEST EFFICIENCY!

JOY WN-114 AIR COMPRESSOR



The JOY WN-112 is a two-cylinder, heavy-duty, continuous type unit, having all the features of the WN-114. It delivers 368 to 1828 CFM, up to 3656 CFM in twin units.

Check these Features:

- Delivers 1092 to 3656 CFM, up to 7312 CFM in twin units
- Four Cylinders, two stage, double acting, water cooled
- Requires less room, costs less to install
- Exclusive Dual Cushion Valves are more efficient, have longer service life
- Exclusive Load Control assures lower operating costs
- Simpler design—Longer life—Less maintenance

WRITE FOR BULLETINS, OR

Consult a Joy Engineer

W&D 12827

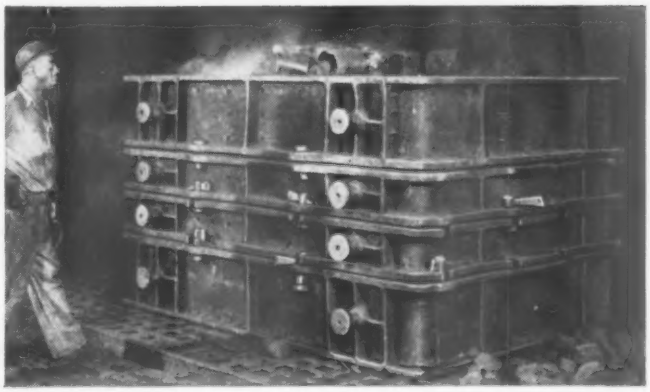
JOY MANUFACTURING COMPANY

GENERAL OFFICES: HENRY W. OLIVER BUILDING · PITTSBURGH 22, PA.

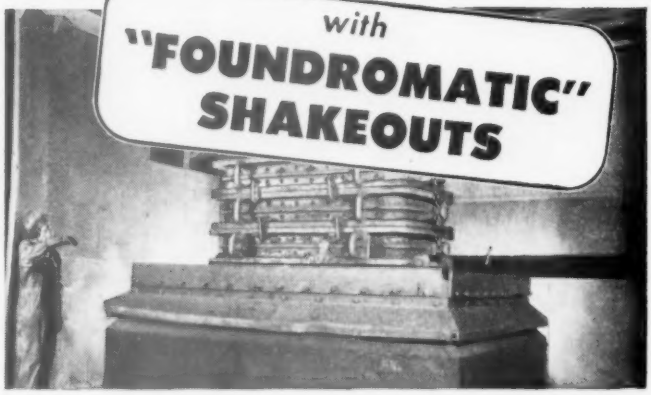
IN CANADA: JOY MANUFACTURING COMPANY (CANADA) LIMITED, GALT, ONTARIO

LEADING FOUNDRIES GET

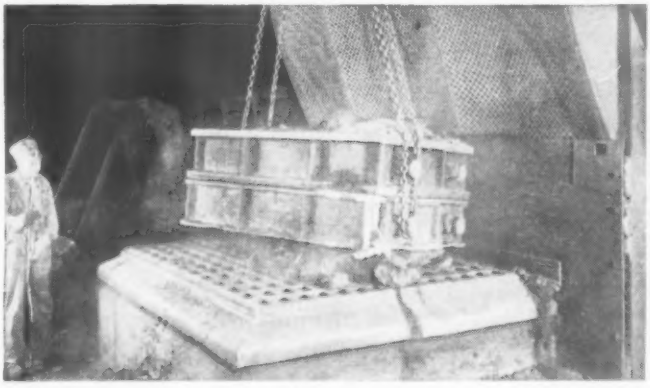
Bonus Production



Two 8′ x 10′ Units in Parallel at Leading Cincinnati, Ohio, Foundry.
Floor capacity was increased when these two *Foundromatic* shakeouts were installed in parallel in this foundry. In one nine hour shift they average as high as 40 complete molds with mold weights up to 71,000 lbs!



8′ x 10′ Unit at Falk Corporation, Milwaukee, Wisconsin.
After five years of constant use, this shakeout still provides trouble-free service. This Allis-Chalmers shakeout has never been removed from foundation despite constant operation. Extremely low maintenance costs are reported by Falk company officials.



6′ x 8′ Unit at Bucyrus-Erie Co., South Milwaukee, Wis.
Shakeout runs 12 hours a day, six days a week, and averages between 15 and 20 tons of castings each day. This installation completely serves its purpose of speeding castings from the foundry floor to the machine shop.

4′ x 6′ Unit at Taylor-Wharton Iron & Steel Company, High Bridge, N. J.
This 5° slope shakeout receives sand and castings up to 300 lbs. from the discharge end of an apron conveyor. Sand spillage is minimized and casting cleaning performance is excellent.

YOU CAN GET SIMILAR EFFICIENCY with *Foundromatic* Shakeouts. The body is a one piece, welded, stress-relieved structure, essential for long mechanism life and reduced maintenance. Load on the shakeout is not limited by size of bearings or shaft — shaft is shorter and sturdier than in conventional units.

Your requirements can be met by one of the nine single-body shakeouts from 3′ x 5′ with capacity of one ton, to 8′ x 10′ with capacity of 25 tons. Multiple units can be supplied with capacities of 100 tons or larger.

Call your nearby A-C Sales Office for information, or write for new Bulletin 07B6365A.

A-3013

ALLIS-CHALMERS, 1032A SO. 70 ST.
MILWAUKEE, WIS.

A-C ALLIS-CHALMERS

ALLIS-CHALMERS

Foundromatic and *Regulex* are Allis-Chalmers trademarks.

Foundry Equipment for Bigger Output-Better Working Conditions!

NEW B&W ALLMUL FIREBRICK

Designed to Cut Furnace Costs

Now you can have the heavy-duty firebrick you always wanted . . . a practically pure mullite brick that costs far less than similar heavy-duty refractories.

It's the new ALLMUL Firebrick, designed to slash refractory costs by **eliminating frequent need for furnace relining,** by **cutting maintenance** and **saving valuable production time.** In fact, ALLMUL is designed to give you a new standard of economy and performance in furnace construction and operation.

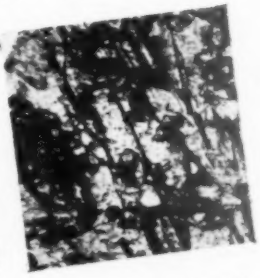
If you are now using all-mullite type refractories, you will be surprised by the low initial cost of ALLMUL . . . at the over-all savings you can make with this practically pure mullite firebrick.

If you are using part-mullite refractories with the thought that top quality mullite refractories cost more than you could afford to pay, economical B&W ALLMUL Firebrick is well worth investigating.

ALLMUL shows no spall loss in the rigorous spalling test, in which firebrick—after first having been heated to 3000 F for 24 hours—is alternately heated to 2550 F and chilled in an air-water blast for 12 cycles.

WHAT IS MULLITE?

Mullite—a crystalline compound with the formula $3Al_2O_3 \cdot 2SiO_2$—is the *only* compound of alumina and silica stable at high temperatures. It's the ingredient which potentially gives firebrick a high melting point, high hot load strength, high resistance to spalling, and good volume stability. But unless ingredients are properly selected, proportioned and processed, mullite crystals are small, widely separated and often embedded in a matrix of silica. The valuable properties of mullite are thus lost.



ALLMUL, on the other hand, is nearly all pure, tough, interlocking mullite crystals, with a small amount of highly durable corundum, as shown in the photomicrograph, and it contains no free silica. This accounts for the truly amazing strength and heat resisting properties of ALLMUL.

Many Applications for NEW B&W ALLMUL

If heat is the heart of the operation, you'll find new B&W ALLMUL makes possible important economies. For example, ALLMUL can be used in glass tanks of all kinds; ferrous and non-ferrous metal furnaces; ceramic kilns; enameling furnaces; chemical and petroleum furnaces; and in many other applications. Even under the most punishing service conditions, ALLMUL Firebrick withstands heavy loads and high temperatures. See how ALLMUL can cut refractory costs in your specific application.

NEW 4-page Bulletin gives you all the facts about ALLMUL Firebrick. Just clip coupon and mail today.

See ALLMUL at the IRON AND STEEL Exposition

SEPT. 26 to 29

THE BABCOCK & WILCOX CO. • REFRACTORIES DIVISION • 85 LIBERTY STREET • NEW YORK 6, N. Y.

☐ Please send a copy of your new bulletin R-29 on ALLMUL Firebrick.

☐ I would like to see a B&W Refractories Representative.

NAME_____

COMPANY_____

ADDRESS_____

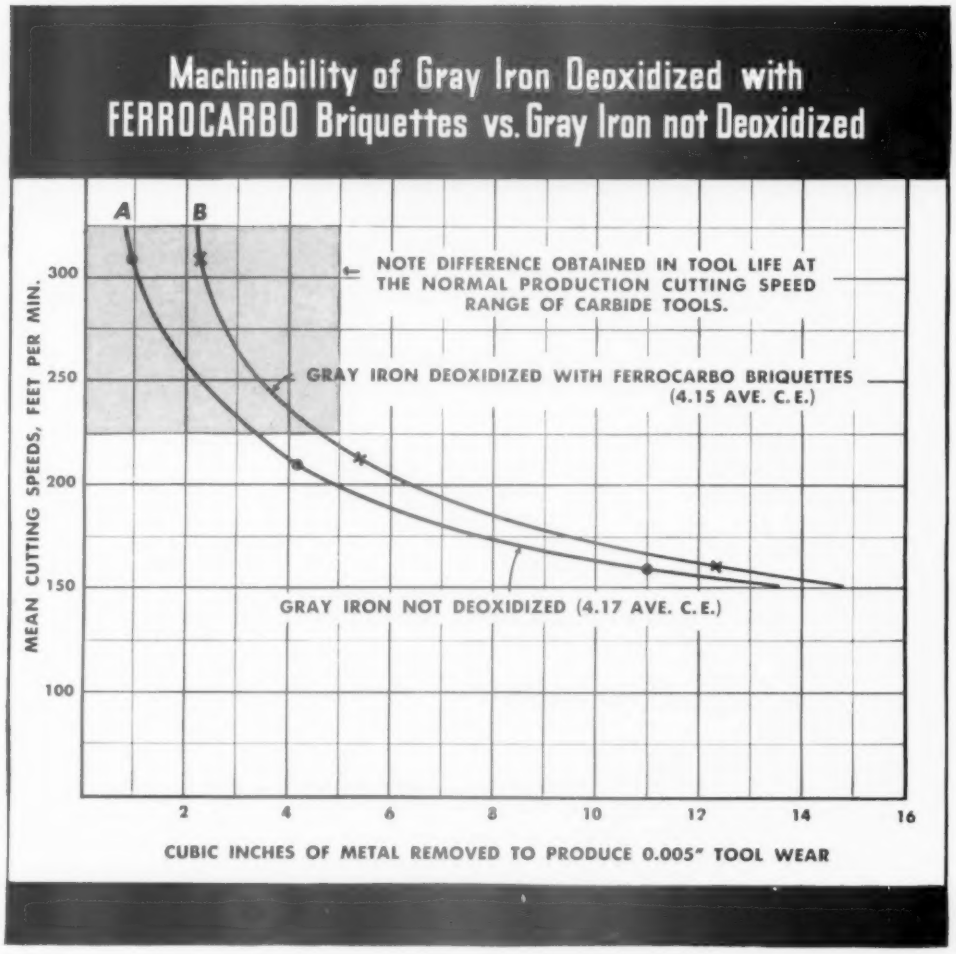
CITY_____

STATE_____

BABCOCK & WILCOX

THE BABCOCK & WILCOX CO.
REFRACTORIES DIVISION
GENERAL OFFICES: 85 LIBERTY ST, NEW YORK 6, N.Y.
WORKS: AUGUSTA, GA.

Increasing TOOL LIFE by 150%



FERROCARBO silicon carbide Briquettes, when added to the cupola charge, offer many advantages. The chart illustrates the result of an actual test and shows their effect on machining the "as cast" surface, plus a shallow cut into the underlying metal. The distance from A to B is the *extra* margin of tool life obtained when machining castings treated with FERROCARBO Briquettes. Tools employed in test were single point cemented carbide.

Increased tool life in machining castings produced by adding FERROCARBO Briquettes in the cupola charge results because: 1. Surface chill is sharply reduced. 2. Easily machined fine grained iron is produced with a random dispersion of flake graphite. 3. Cutting tools encounter fewer segregated hard areas, because of the more uniformly machinable gray iron structure.

This added tool life is an important economy. Tool life, in proportion to metal removed, increases as machining speeds increase...thereby leading to high speed economical production of machined cast iron parts.

FERROCARBO Briquettes can help you produce better quality, easily machinable and more salable castings. Our distributors are well qualified to explain in detail how these advantages can be obtained in your operation. The Carborundum Company, Bonded Products and Abrasive Grain Division, Niagara Falls, N. Y.

FERROCARBO Briquettes

BY CARBORUNDUM

TRADE MARK

FERROCARBO Distributors: KERCHNER, MARSHALL & CO., PITTSBURGH, Cleveland, Birmingham, Philadelphia and Buffalo; MILLER AND COMPANY, CHICAGO, St. Louis and Cincinnati; WILLIAMS AND WILSON, TORONTO, Montreal and Windsor.

"Carborundum" and "Ferrocarbo" are registered trademarks which indicate manufacture by The Carborundum Company

TODAY'S BIG PROBLEM IN ALL FOUNDRIES...

Increased Production of Good Castings Per Man-Hour!

It is difficult to reduce ordinary operating costs these days, but it is possible to improve considerably the cost-production equation by greater unit production resulting in greater profit with lower operating costs and the same total production.

The solution to this problem lies in the application of improved methods, facilities and procedures for each foundry as required. There is no exact formula—each foundry must be surveyed and analyzed individually to determine the changes necessary to achieve the production improvement possible in that plant.

This is a routine job for Knight Engineers, who are familiar with the operation of hundreds of foundries—many that have had production problems similar to yours. These men, with 10 to 25 years' experience in foundry management, production, engineering or equipment, can quickly analyze your operations and make recommendations to achieve increased unit production, better quality castings and reduced scrap.

It may be that only better application or more efficient use of existing methods and facilities or a more equitable wage incentive plan is required—or it may be that a series of progressive improvements to several departments is required—but Knight Engineers will be glad to find out for you and work with you regardless of how large or small the job may be.

Call or write the Knight office in either Chicago or New York for immediate attention.

KNIGHT Services For Foundries:

- Foundry Engineering
- Architectural Planning
- Foundry Layout
- Foundry Modernization
- Foundry Management
- Industrial Engineering; Job Evaluation, Incentives
- Production and Cost Control

LESTER B. KNIGHT & ASSOCIATES INC.

Consulting Engineers

600 W. JACKSON BLVD.
CHICAGO 6, ILLINOIS

30 CHURCH STREET
NEW YORK 7, NEW YORK

CONSULTING SERVICE
for Management • Sales • Production

ENGINEERING SERVICE
for Surveys • Modernization • Mechanization

ON THIS OUR 50TH ANNIVERSARY WE GRATEFULLY ACKNOWLEDGE THAT OUR SUCCESS MUST BE MEASURED IN THE ACHIEVEMENTS OF OUR FRIENDS . . OUR CUSTOMERS IN MANY INDUSTRIES . . WHOM WE HAVE HAD THE PLEASURE OF SERVING THROUGH THE YEARS

OTTAWA SILICA COMPANY

OTTAWA, ILLINOIS

SUBSIDIARIES

MICHIGAN SILICA COMPANY
ROCKWOOD, MICHIGAN

LA SALLE SILICA COMPANY
OTTAWA, ILLINOIS

Save CORES & CORE BOXES TIME & MONEY

MARTIN ENGINEERING COMPANY LEADS THE WAY AGAIN

"PROTEXABOX" PINS

Will not loosen—cannot mar box face. Protective rubber tip guaranteed to stay on.

"STRIPINSERT"

Protects parting line — easily installed in old or new boxes. Eliminates steel facing.

NOW! NEW! Cutters for groove available at moderate cost.

"HOLINER" BUSHINGS

Stop abrasion between blow plate and core box. Protect blow holes.

"SAND ARRESTER TUBES"

Perfect cores every time! Guaranteed for 100,000 blows!

"PULLINSERT" BLOW BUTTONS

Available in nine popular sizes—positively stop sand blasting under blow holes.

"VIBROLATOR"

Draw cores without damage. Guaranteed to feed sand from any hopper.

Trade-Marks and Patents Applied for

YOUR JOBBER WILL BE HAPPY TO SHOW YOU ANY OF THESE MONEY-SAVING PRODUCTS.

Folders describing the above products available on request.

MARTIN ENGINEERING COMPANY

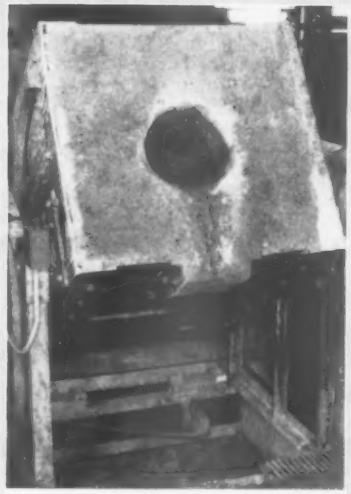
KEWANEE 2, ILLINOIS

TAM

Zircon grog type ramming mix

Pouring heat from Allis Chalmers induction furnace at Michiana Products Co.

The same furnace as lined wet with zircon lining.



Furnace ready for relining after 100 heats.

LASTS 4 TO 5 TIMES LONGER

In these 600 lb. capacity Allis Chalmers induction furnaces operated by the Michiana Products Co. of Michigan City, Indiana . . . TAM zircon grog type ramming mix provides excellent lining service. This extended life is realized in melting a variety of alloys ranging from low carbon stainless to heat resisting alloy with nickel contents from 3 to 65% and chrome contents from 8 to 30%.

Resistance to high temperatures and the difficult melting conditions involved is due to the superior characteristics of this lining material. More metal is melted at less cost per ton. That's why it pays to get the full facts on TAM ramming mixes. They may be obtained readily from our field engineers or by addressing your inquiry to our New York office.

TAM PRODUCTS
Registered U. S. Pat. Off.

TAM is a registered trademark

TITANIUM ALLOY MFG. DIVISION
NATIONAL LEAD COMPANY

Executive and Sales Office: 111 BROADWAY, NEW YORK CITY · General Offices, Works, and Research Laboratories: NIAGARA FALLS, N. Y.

For low-cost efficiency on all your grinding jobs

You get productive efficiency with Simonds Abrasive Snagging Wheels on your swing frame, floor stand and portable grinders. They stand up to the severest strain of rough snagging . . . giving action that bites into the toughest metal . . . and economy that shows up in top tonnage ground.

Resinoid bonded for speeds up to 9500 s.f.p.m. . . . Vitrified bonded for speeds up to 6500 s.f.p.m. Available in specifications for cleaning castings and billets and for use on a variety of metals and non-metals.

Write for Bulletin ESA 62 for full information and the name of the Simonds Abrasive distributor equipped to serve you locally.

SIMONDS ABRASIVE COMPANY, PHILADELPHIA 37, PA., DISTRIBUTORS IN PRINCIPAL CITIES

GRINDING WHEEL INSTITUTE MEMBER

DIVISION OF SIMONDS SAW AND STEEL CO., FITCHBURG, MASS. OTHER SIMONDS COMPANIES: SIMONDS STEEL MILLS, LOCKPORT, N.Y., SIMONDS CANADA SAW CO., LTD., MONTREAL, QUE. AND SIMONDS CANADA ABRASIVE CO., LTD., ARVIDA, QUE

Compact Allis-Chalmers centrifugal cupola blower replaced bulky rotary positive type blower in this Milwaukee, Wis., foundry! Rated 4400 cfm at 1.5 lbs G, driven by an Allis-Chalmers induction motor. Notice light, simple foundation . . . compactness of out-of-the-way installation.

Air is the One Cupola Element You Can Control!

AIR WEIGHT AND VOLUME are the only factors in cupola operation that do not depend on the judgement of your cupola metallurgist! You get *complete* air regulation with Allis-Chalmers centrifugal blowers equipped with air weight control. They *automatically* deliver more or less air, as required, without the necessity of blowing off to atmosphere with subsequent power waste, as with positive pressure blowers.

With A-C blowers, a metered amount of oxygen enters the cupola; you get a uniform temperature and greater uniformity in composition of the metal.

You get these construction features in A-C blowers:

1. CLOSE COUPLED design makes them compact. Adapter piece of cast iron rigidly connects blower casting to motor frame.
2. CAST CASINGS give long life impossible with fabricated constructions. One piece cast inlet nozzle and cover facilitates inspection and cleaning.
3. ANTI-FRICTION BEARINGS support the one moving part, the impeller, usually "overhung" on motor shaft.

Specify A-C blowers for cupola installations and replacements. For more information call your nearby A-C Sales Office or write for Bulletin 16B6048.

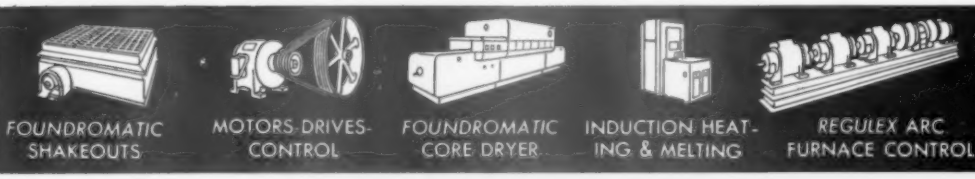
A-3054

ALLIS-CHALMERS, 1032A SO. 70 ST. MILWAUKEE, WIS.

Foundromatic and *Regulex* are Allis-Chalmers trademarks.

ALLIS-CHALMERS

Foundry Equipment for Bigger Output-Better Working Conditions!



Round Flasks and

2-Part Flasks

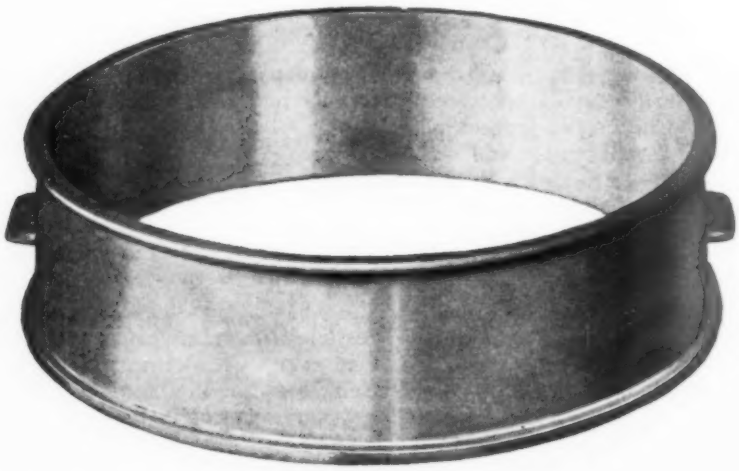
3-Part Flasks

Any Diameter
12" THROUGH 34"
(Even Inches)

Any Height
COPE AND DRAG

THE JACKETS

Hines Round Jackets are available in either aluminum or cast iron. They are carefully machined to assure perfect fit on molds.



THE HINES

3431 WEST 140th ST.

Jackets by Hines

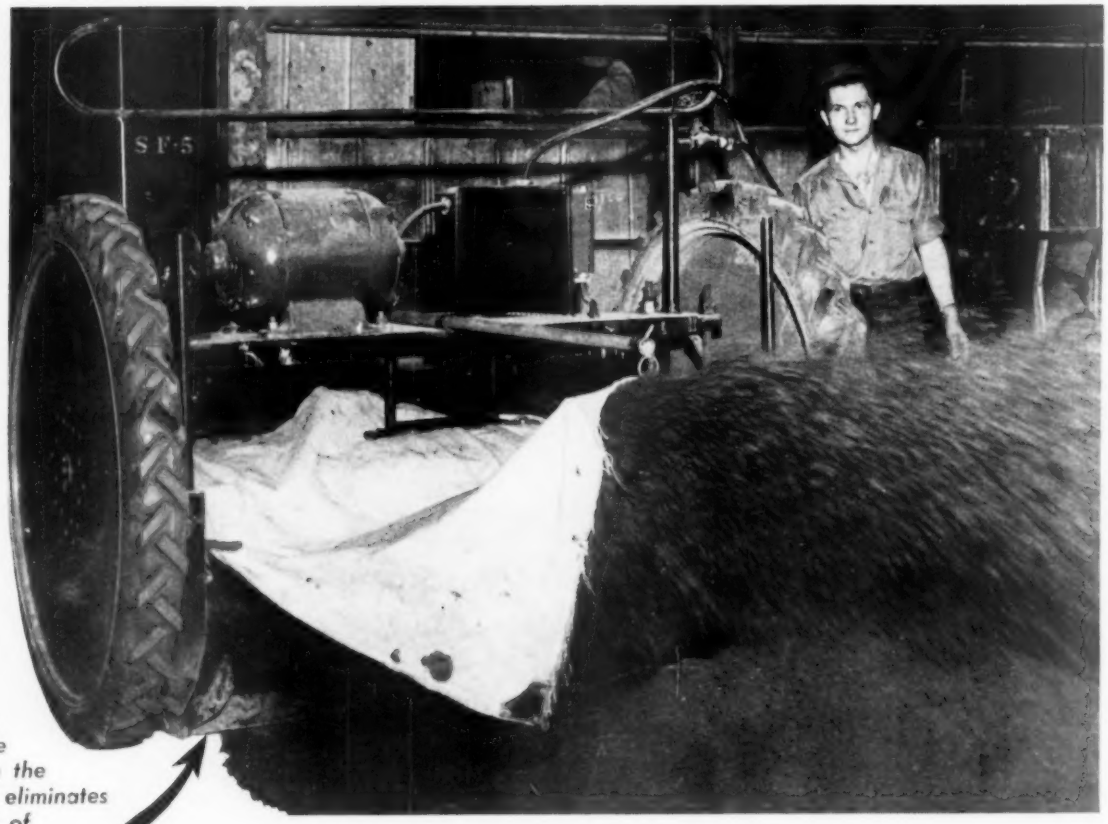
Hines Round *Aluminum* Slip Flasks in either two or three parts are unequalled for making fire pots, sprocket wheels, gears, pulleys, etc. They are lightweight, easy to handle and will turn out more castings with less sand. They put jobs on the bench and machines that were previously made on the floor. Replace tight boxes, eliminate shakeout costs and save valuable foundry space. One flask makes any number of molds. A most flexible flask in any foundry. Pins are hardened, ground and heavy chrome plated. Diameters in even inches from 12″ through 34″, any height. Companion jackets available in either aluminum or cast iron.

Write for Quotations—Specify Diameters and Heights Desired

FLASK CO.

CLEVELAND 11, OHIO

DO YOU NEED THOROUGHLY CONDITIONED SAND TO MAKE BETTER CASTINGS?



This drag scoops the sand from the floor and eliminates any layer of unconditioned sand

This Moulders' Friend was rolled off a truck on to the floor of a North Carolina foundry where it conditioned all of the moulding sand without any rearrangement of the heaps. The Moulders' Friend will fit your foundry too.

THE MOULDER'S FRIEND GIVES YOU THOROUGHLY CONDITIONED SAND

The thousands of flat tempered steel wires in the brush revolving at high speed pick up small particles of used sand, added bond and moisture and blend them thoroughly. This process is so thorough that either clay bond or new moulding sand is blended with the heap successfully and a minimum ot moisture is required.

THE BRUSH DOES THE JOB

●

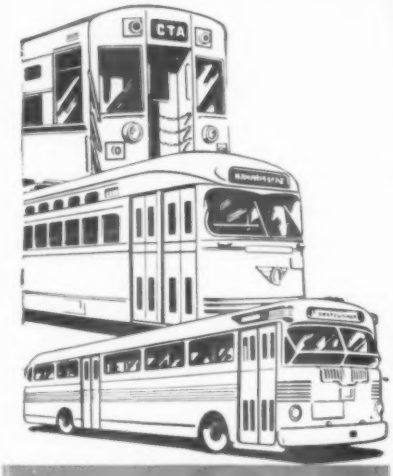
THE MOULDER'S FRIEND SAVES MONEY . . .

capacity over one ton per minute—one man operation—simple construction—easy to buy and use—pays for itself with better castings and less labor.

Investigate The Moulders' Friend today. See one in operation.

"The Moulders' Friend"
Dallas City, Illinois

HERE'S HOW...



CHICAGO TRANSIT AUTHORITY CUTS MELTING TIME IN HALF

. . . cuts fuel cost 50% . . . cuts metal losses 40%

Chicago Transit Authority, one of the world's largest transportation systems, operating 2,400 streetcars, 1,625 elevated cars, and 1,100 buses, installed a Fisher oil fired Simplex Melting Furnace for remelting, reclaiming scrap, brass, and bronze. Journal and axle bearing brasses and worn parts from all types of rolling stock are melted down and recast into new parts.

The new Fisher Simplex replaces a conventional oil fired spherical type open flame furnace. Check this "Before and After" story of faster melting, lower fuel cost, and lower metal losses.

	BEFORE	AFTER
Heating time 1000 lb. charge	2½ hrs.	1 hr.
Fuel cost per pound melted	$.0056	$.0027
Metal Loss	5%	3%

FISHER ADVANTAGES

Furnace charges *easily* from front at convenient height. . . . More scrap can be charged because of large area above molten metal line. . . . Uses open flame reverberatory melting, the *fastest* fuel fired melting method. . . . Two section furnace shell removable for *easy* relining.

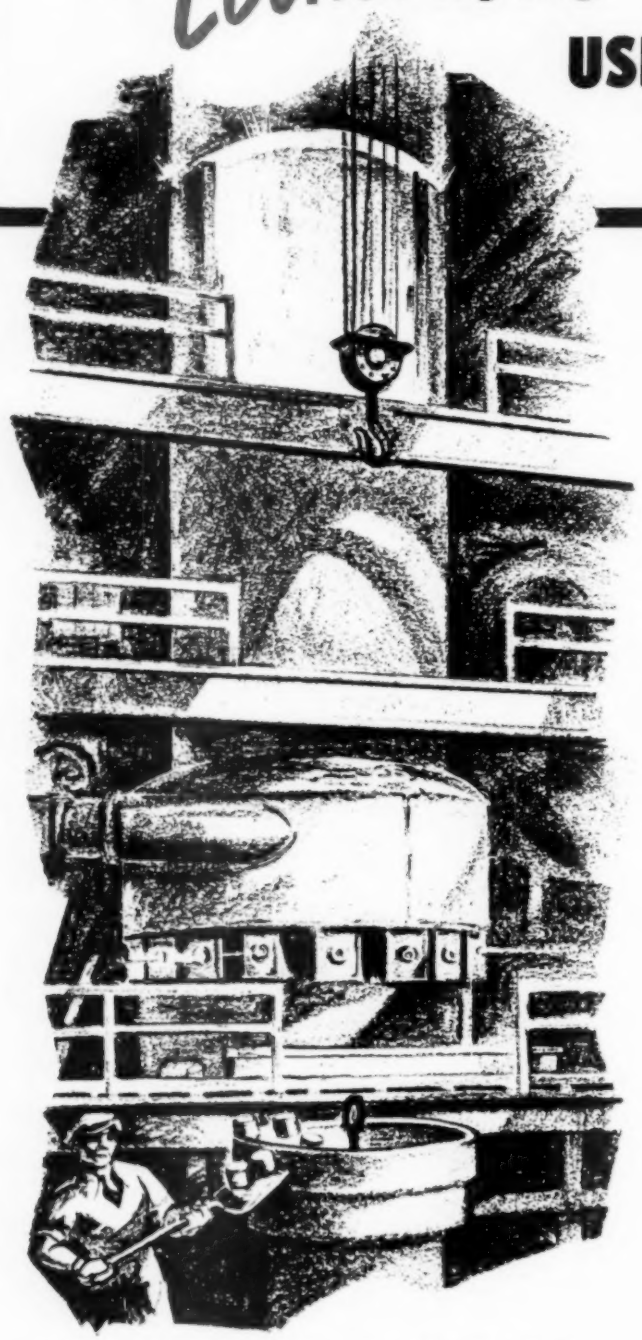
Ask for bulletin #28-A "Fisher Simplex Furnaces."

Fisher Furnaces

A DIVISION OF LINDBERG ENGINEERING CO.
2453 West Hubbard Street, Chicago 12, Illinois

FOR *ECONOMICAL* CUPOLA OPERATION

USE OHIO FERRO-ALLOYS BRIQUETS



FERRO-SILICON 25 - 50 - 65 - 75 - 85 - 90%
SPECIAL BLOCKING 50% FERRO-SILICON
LOW CARBON FERRO-CHROME SILICON
HIGH CARBON FERRO-CHROME
FERRO-MANGANESE • BOROSIL • SIMANAL

BRIQUETS
SILICON • MANGANESE • CHROME
SILICO - MANGANESE

Economy is an important factor in every cupola operation. It will pay you to consider the advantages and resultant savings on material costs made possible by the use of Ohio Ferro-Alloys Briquets.

You may select the most economical charge of scrap and pig iron and adjust the analysis with these Briquets.

THE FOLLOWING ARE AVAILABLE

Kind of Ohio Ferro-Alloys Briquet	Color	Contained Alloy
Silicon	gray	Two Sizes { 1 lb. Silicon / 2 lb. Silicon
Silico-Manganese	yellow	½ lb. Silicon and 2 lb. Manganese
Manganese	red	2 lb. Manganese
Chrome	green	2 lb. Chromium

Ohio Ferro-Alloy Briquets are available in bulk, packed in steel drums, or in box type pallets for lift truck handling. Immediate shipment from stock at plants located at Philo, Ohio—Tacoma, Washington, and warehouses at San Francisco, California, Los Angeles, California and Minneapolis, Minnesota.

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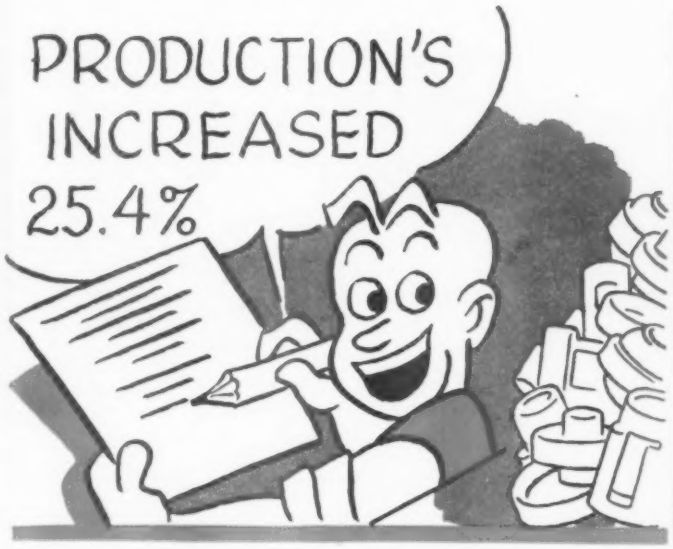
PHILO RANGER

Ohio Ferro-Alloys Corporation
Canton, Ohio

Chicago Detroit Pittsburgh San Francisco
Minneapolis Birmingham Los Angeles Tacoma

Sales Agents & Warehouses
San Francisco Area: Pacific Graphite Co. Inc., Oakland 8, California
Los Angeles Area: Snyder Foundry Supply Co., Los Angeles 11, California
Minneapolis Area: Foundry Supply Co., Minneapolis, Minnesota

Sales Agents:
E. A. Wilcox Co., Arctic Bldg., Seattle 4, Washington; Phone—Seneca 0[illegible]
Schuler Equipment Co., First National Bldg., Birmingham, Alabama



Manufacturer* Cuts Blast Cleaning Costs 51.8% with MALLEABRASIVE

Test by Reading Gray Iron Castings Inc., of Reading, Pa. proves Malleabrasive saves 51.8% or $3,908.74 a year on blast cleaning costs in their plant.

If you want to save on blast cleaning costs . . . look at the results of this test made by Reading Gray Iron Castings, Inc. After just seven weeks the test showed that 5,900 lbs. Malleabrasive did the same job as 10,300 lbs. of conventional abrasive...replacement parts costs were down 64.7% . . . production increased 25.4% while the cost per ton cleaned was slashed by 51.8%. Here's concrete proof that Malleabrasive's the best abrasive you can buy!

Make Your Own Test!

We'll send you the data needed to run a comparative test like this right in your own cleaning room! Now you can prove to yourself that Malleabrasive slashes cleaning costs up to 50% and more. Malleabrasive is more than "heat treated" or "annealed". Malleabrasive is guaranteed to outperform ordinary abrasives when comparative tests are properly run.

For full details, plus a copy of other Malleabrasive tests, write for TEST INFORMATION, THE GLOBE STEEL ABRASIVE CO., Mansfield, Ohio.

Packed in new orange striped 100 lb. bags

Save on blast cleaning with

PATENTED† **Malleabrasive®**

MEMBER FEMA

†U.S. Patent #2184926
(other patents pending)

THE GLOBE STEEL ABRASIVE CO., MANSFIELD, OHIO

• MANUFACTURERS OF METAL ABRASIVES SINCE 1907 •

Powder-Cutting

Steps Up Production of Stainless Steel Castings 32 Times . . .

Centrifugally-cast rings of stainless steel are cut in 15 minutes time, increasing production 32 times.

Riser cutting of centrifugally-cast stainless steel rings used to be a difficult and time-consuming job. In one foundry which used a boring machine, this operation took eight hours per casting. When powder-cutting was introduced, the time was reduced to approximately 15 minutes—a 32-fold increase in production.

In another foundry, powder-cutting was profitably used to remove 3/8 to 1 in. of metal from stainless steel castings. The machining cost for this type of work has been $24.00 per casting. Substitution of powder-cutting brought the overall cost, including finish-grinding and chipping, to $7.53 per casting, and reduced the time from 8 hours to 1 hour. For an order of 60 castings, the foundry saved $988.20 and 360 hours of operating time.

If you have stainless steel or other oxidation-resistant metals to cut, LINDE's service engineers can show you how powder-cutting methods can be used with profit. Phone or write the nearest LINDE office.

Here, risers on stainless steel castings are being powder-cut—a time saving of 30 per cent over the former methods.

Linde
Trade-Mark

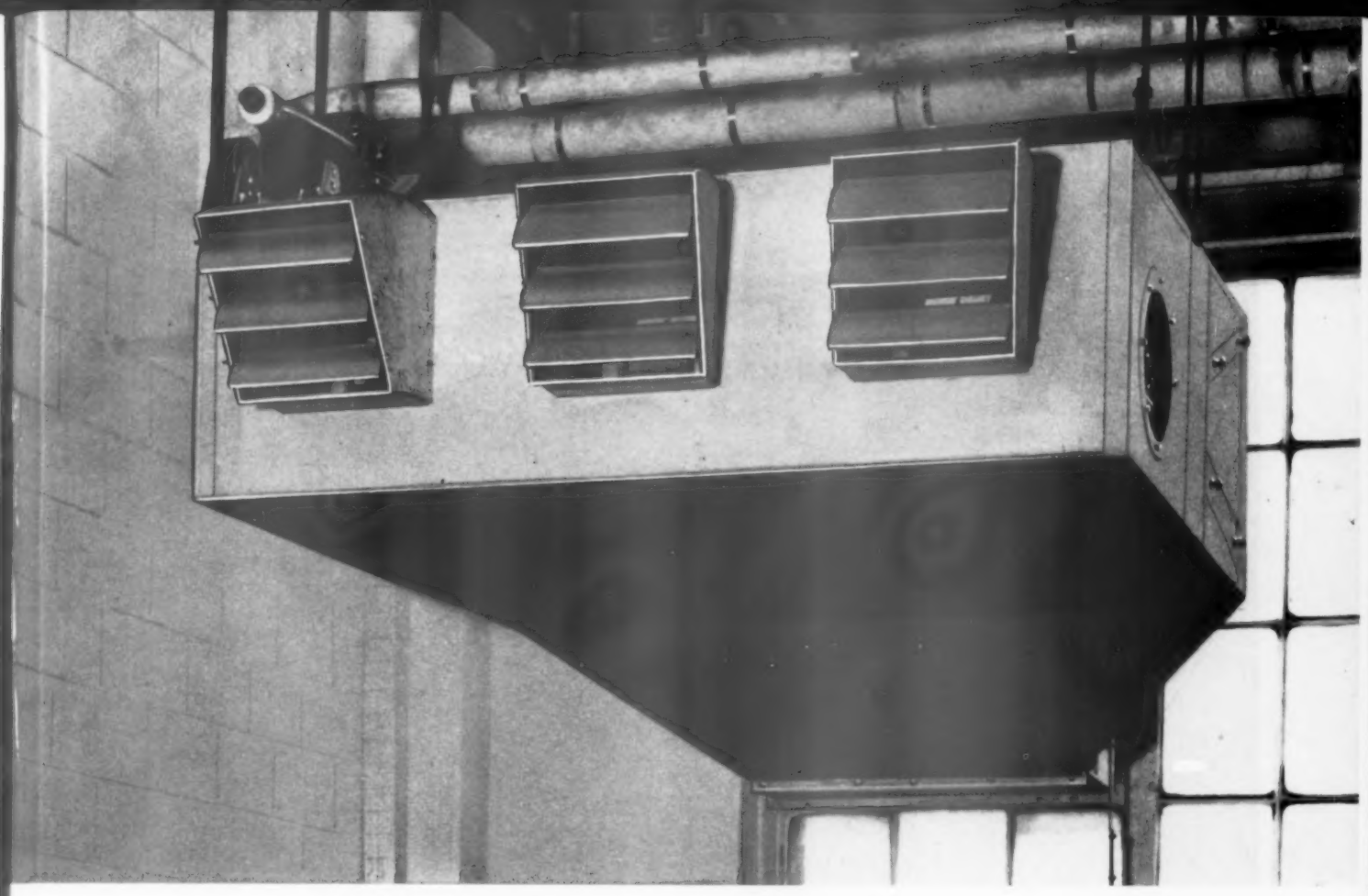
THE LINDE AIR PRODUCTS COMPANY

Unit of Union Carbide and Carbon Corporation

30 East 42nd St., New York 17, N. Y. UCC Offices in Other Principal Cities

In Canada: DOMINION OXYGEN COMPANY, LIMITED, Toronto

The word "Linde" is a registered trade-mark of The Linde Air Products Company



Economical, Space-Saving
Way To Supply Your Make-Up Air!

- **Suspended heating and ventilating unit takes no floor space!**
- **Few units required for large-area work because of large capacities!**
- **Efficient blowers with stable pressure characteristics!**

In the foundry, it is often necessary to exhaust large amounts of air for dust removal. In these cases, economy of make-up air becomes an important question.

Above is a practical answer—a typical installation of a "Buffalo" Suspended Lowboy Heating and Ventilating Unit. Mounted at window, it draws in outside air, cleaning it through throw-away filters and, in winter, heats it. In summer, unit acts as a fan and air cleaner. 3,400 to 35,000 c.f.m. capacities. Write for Bulletin 3704 for this "best buy" in a rugged, easily installed make-up air unit!

"Buffalo" FIRST FOR FANS

BUFFALO FORGE COMPANY

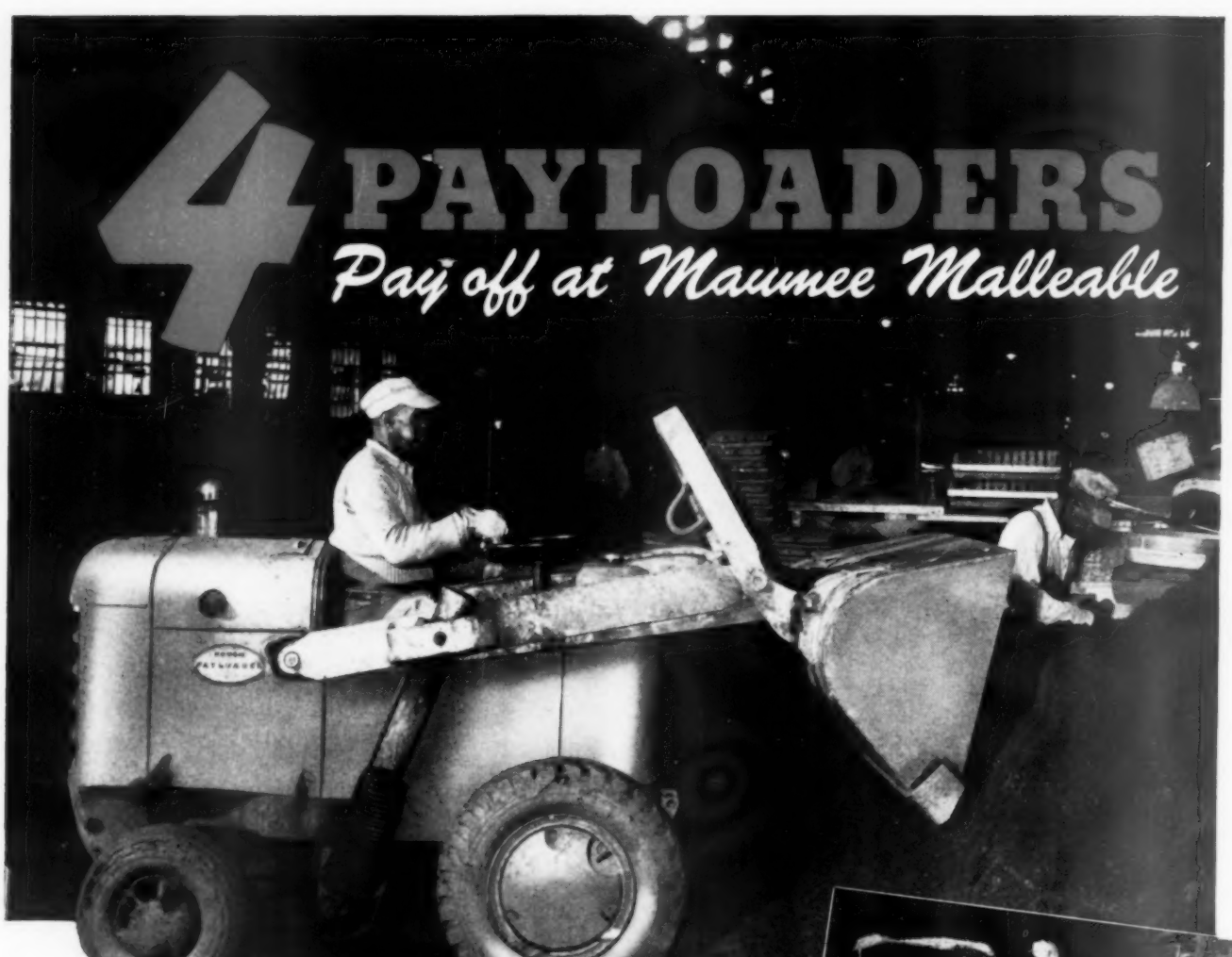
221 MORTIMER ST. BUFFALO, NEW YORK

Canadian Blower & Forge Co., Ltd., Kitchener, Ont., Branch Offices in all Principal Cities

VENTILATING FORCED DRAFT | AIR WASHING COOLING | AIR TEMPERING HEATING | INDUCED DRAFT EXHAUSTING PRESSURE BLOWING

4 PAYLOADERS

Pay off at Maumee Malleable



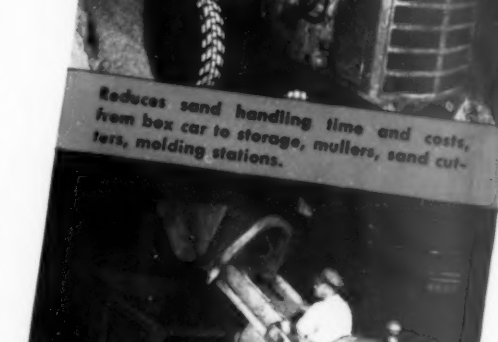
Slash Handling Costs, Speed Production, Improve Quality

Four Model HA "PAYLOADERS" acquired by Maumee Malleable Casting Co., Toledo, during the past four years have provided these four important benefits: reduced costs, increased production, improved quality and stimulated employee morale.

Maumee's results with "PAYLOADERS" are echoed from scores of other foundries where "PAYLOADERS" have gone to work . . . digging, loading, carrying and dumping sand and many other materials such as slag, sprues, coke, scrap, flasks and annealing boxes.

One-man operated, the "PAYLOADER" does more work than a crew of shovel men . . . saves time, money and man-hours. It will pay you to find out how "PAYLOADERS" can pay off in your foundry as they have for Maumee and many others. Get the full story from your "PAYLOADER" Distributor or write The Frank G. Hough Co., 703 Sunnyside Avenue, Libertyville, Illinois.

Reduces sand handling time and costs, from box car to storage, mullers, sand cutters, molding stations.



Better, more uniform sand results from mixing 1,000 lb. batches instead of individual shovel loads.

SAY "HUFF"

PAYLOADER®

Manufactured by THE FRANK G. HOUGH CO.

More than a "Separator"

PROTECTOMOTOR PIPE LINE FILTER DELIVERS *Clean* AS WELL AS *Dry* AIR

Rust, Pipe Scale, Dirt and Dust removed in addition to Water and Oil

Continual repeat orders from leading foundries prove the efficiency, long-life and all around economy of Protectomotor *Double Action* Pipe Line Filters. Simple to install, Protectomotors often save their entire cost in a single month.

Find out how Protectomotors can be used in your foundry for increased production at less cost—

WRITE FOR CATALOG

DOLLINGER CORPORATION

36 CENTRE PK. ROCHESTER 3, N. Y.

Air Filter Headquarters

FILTERS FOR PIPE LINE, ENGINE INTAKE AND BUILDING VENTILATION

Temperature Changes Mean Trouble in Unprotected Air Lines

Moisture in compressed air is condensed as the air passes through cold sections of pipe. Unless removed, this water washes out lubrication from air-powered tools, freezes upon expansion in these tools, and causes loss of power or stoppage due to clogging of ports; causes delays and waste at other points of compressed air usage. Staynew Pipe Line Filters (Protectomotors), installed as near point of use as possible, remove water and oil, preventing these troubles.

Model CPH

Double Action ★ Exclusive Construction

Air or gas strikes deflector (2), and is impinged against sides of housing (1). Oil, water, and heavy dirt particles drop to bottom and are drawn off thru drain (5). Fine dirt particles are removed from air or gas by positive action of the dry-type filtering medium which covers the patented Radial Fin Insert (4). Louvered housing (3) evenly distributes air or gas over surface of insert.

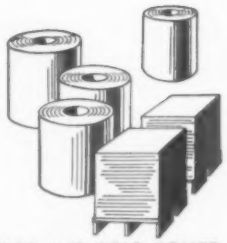
DOLLINGER REG PROTECTOMOTOR U.S. PAT. OFF. STAYNEW FILTERS

with UNIVERSAL flask pins, bushings and closing pins

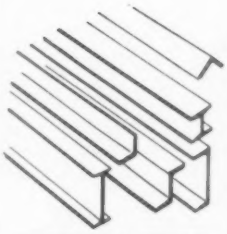
No sighting is necessary to get perfect cope and drag alignment when you use Universal Flask Pins, Bushings and Closing Pins. No time is wasted. Lifting and setting *in one smooth operation* does the job with Cope Pins quickly guided to Drag Pins over tapered loose-fitting Closing Pins which are quickly removed without effort. The Elongated Flask Bushing is specially designed to permit longitudinal expansion to compensate for metal heat *without affecting accurate alignment.* Available for immediate delivery in standard sizes—special sizes and types to order. Direct your inquiries and orders to the office nearest you—1060 Broad St., Newark, N.J., and 5035 Sixth Ave., Kenosha, Wisconsin—or write to our home office.

UNIVERSAL ENGINEERING COMPANY

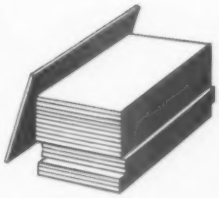
FRANKENMUTH 4, MICHIGAN



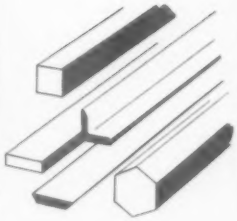
HOT AND COLD ROLLED SHEETS AND STRIP



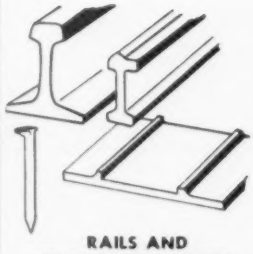
STRUCTURAL SHAPES



CARBON STEEL PLATES

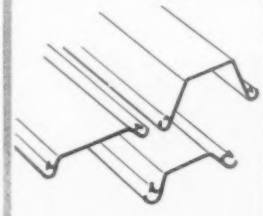


CARBON STEEL BARS

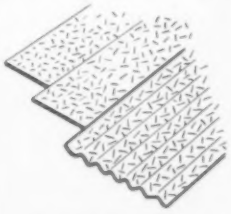


RAILS AND TRACK ACCESSORIES

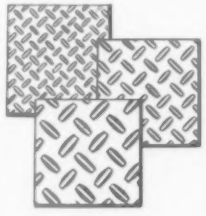
HI-BOND* REINFORCING BARS



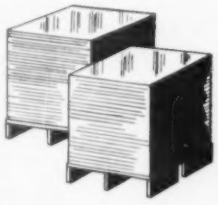
SHEET PILING



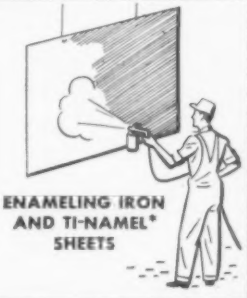
GALVANIZED SHEET PRODUCTS



4-WAY* SAFETY PLATE

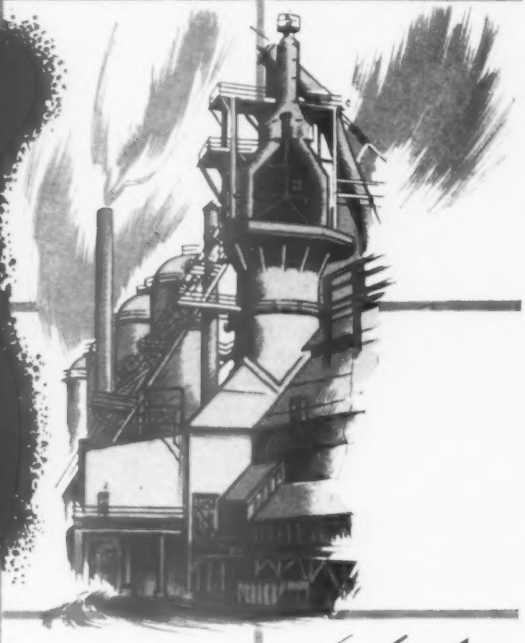


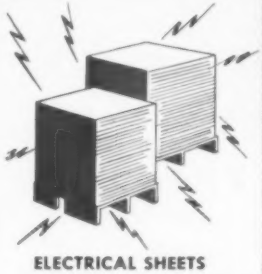
TIN MILL PRODUCTS



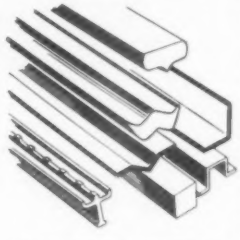
ENAMELING IRON AND TI-NAMEL* SHEETS

you can rely on **INLAND** for the **RIGHT STEEL**





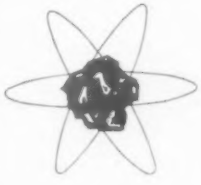
ELECTRICAL SHEETS



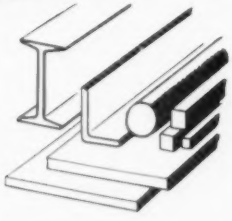
RAIL STEEL PRODUCTS

PIG IRON

LIMESTONE



COKE BY-PRODUCTS



HI-STEEL* PRODUCTS

the men and mills of **INLAND STEEL COMPANY** are geared to serve the industrial heartland

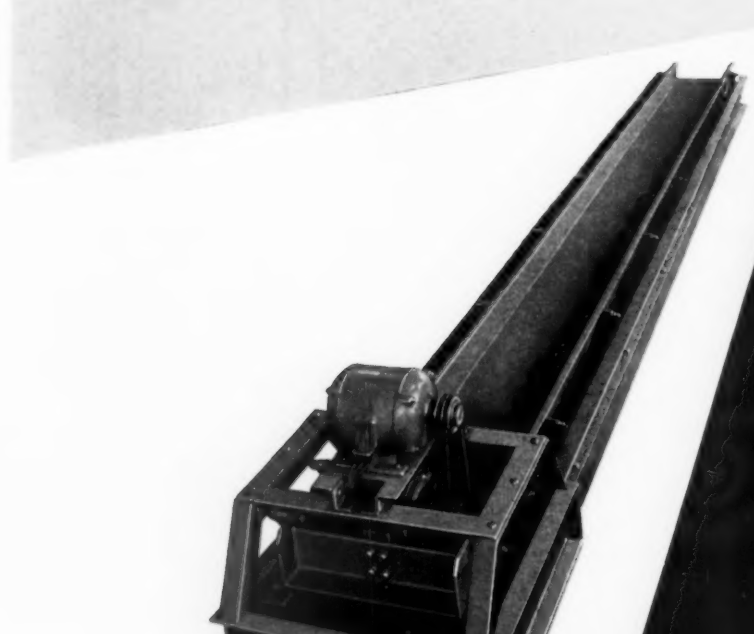
*Reg. U.S. Pat. Off.

INLAND STEEL COMPANY (INLAND) **Dept. F90, 38 So. Dearborn St., Chicago 3, Ill.**

Sales Offices: Chicago, Davenport, Detroit, Indianapolis, Kansas City, Milwaukee, New York, St. Louis, St. Paul

AJAX

Lo-Veyors prove that



the cheapest way to handle sand is NOT to handle it

It is a generally accepted fact in the foundry industry that 100 pounds of material are handled for every 10 pounds of castings produced. There is no money in moving foundry sand with wheelbarrows.

That's why foundrymen are cutting costs and speeding up production with Ajax Lo-Veyors.

They are self-contained, vibrating conveyors ready to set in place and use. Easily installed on your floor, below your floor or suspended from wall or ceiling.

Reciprocating drive unit is completely enclosed...no exposed bearings or idler pulleys subject to rapid wear by sand.

Low first cost, low operating cost, low maintenance cost...it will pay you to look into Ajax Lo-Veyors.

AJAX FLEXIBLE COUPLING CO. INC.

204 English St., WESTFIELD, N. Y.

GET MORE POWER PER POUND WITH THE NEW 360 CYCLE TOOLS

Rotor's new line of 360 Cycle Tools gives you:

More power, less weight . . . nearly twice the power of 180 cycle tools with the same size of motor . . . more than four times the power of universal electric tools per pound of weight.

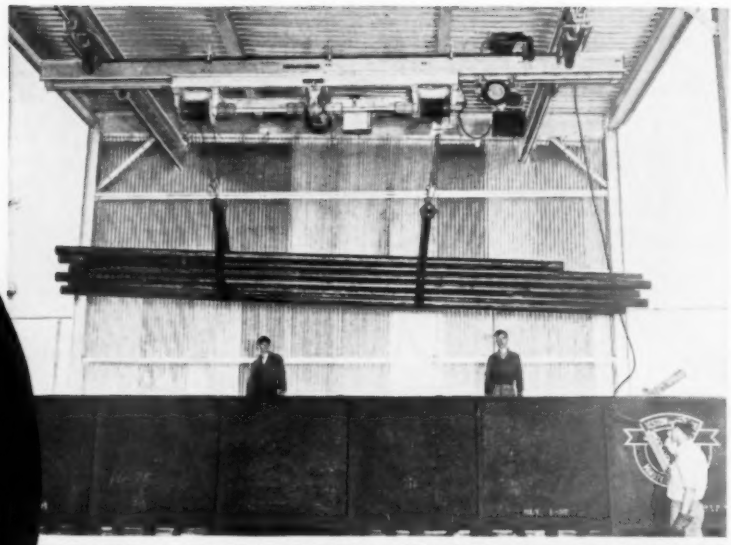
High speed under load . . . Rotor 360 Cycle Tools slow down only about 5% under full load, compared to 20% for pneumatic tools and 45% for universal tools.

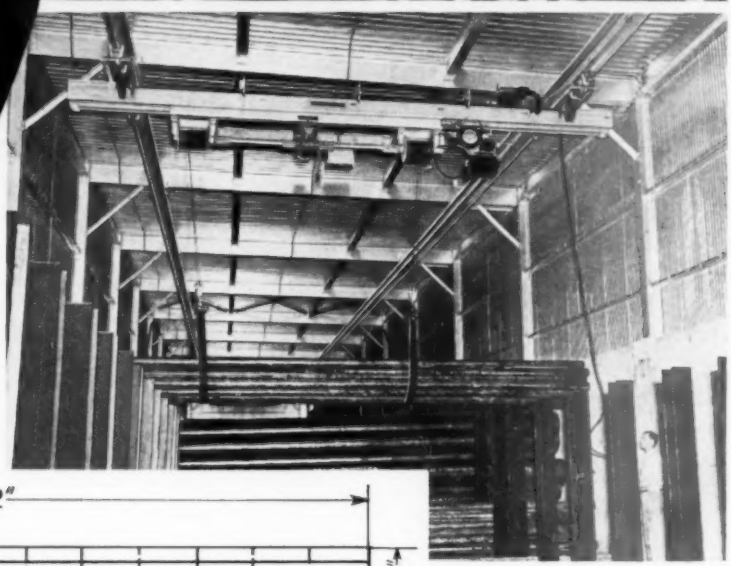
Result: Lower costs through increased production. Ask the Rotor Analyst to explain how the New Rotor 360 Cycle Tools also mean *lower installation cost and lower power cost.*

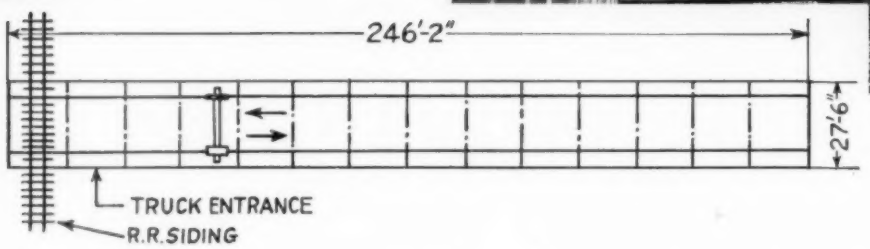
Write for a free copy of Bulletin 36 describing this new Rotor line of grinders, sanders, buffers and polishers.

360 CYCLE O'TOOL

SAVES $30 EVERY CAR UNLOADED







Every time a carload of pipe averaging 60,000 pounds is unloaded in their Roanoke warehouse, The Noland Company, Inc., realizes a saving of thirty dollars.

Two men in the car attach flat slings on the twin-hook electric hoist to a load of pipe. By push-button control, the crane operator raises the load to the upper limit. He then dispatches the 2-ton American MonoTractor Crane to any of 13 stations along the 246 foot craneway where it contacts a retractable limit switch and stops.

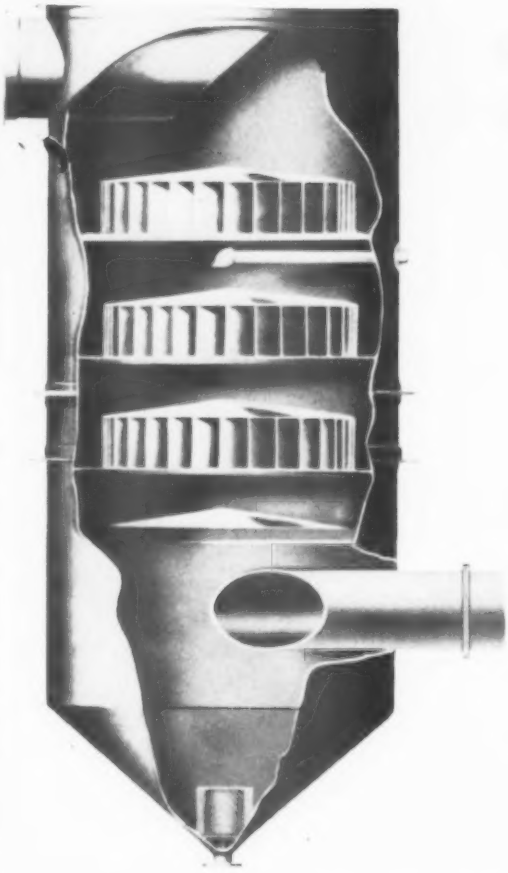
A man on the warehouse floor takes over control, places pipe in the proper rack, unhooks one side of each sling, pulls the sling through the pipe by raising the hoist hooks. The crane is then dispatched back to the car.

It is estimated that the American MonoRail system will pay for itself in less than a year. With hundreds of similar installations to draw upon, American MonoRail can save you money. We'll gladly send an engineer.

THE AMERICAN MONORAIL COMPANY

13104 ATHENS AVENUE **CLEVELAND 7, OHIO**

THERE'S 29 YEARS OF DUST CONTROL EXPERIENCE BUILT INTO EVERY MULTI-WASH COLLECTOR



90 TYPES AND SIZES AVAILABLE WITH CAPACITIES FROM 1,000 TO 36,000 CFM

In 1921 the first Schneible dust collector was developed. At that time it was far in advance of any such equipment available.

Today's Multi-wash unit again sets the pace for simplicity and efficiency in dust collecting equipment.

Whether your waste material amounts to a wheelbarrow load or several carloads a day, there is a Multi-wash system with the capacity to handle it efficiently and economically.

Low operating cost, efficiency and long life are Multi-wash qualities well regarded by foundry operators the country over.

Write for complete information contained in our Bulletin No. 210.

CLAUDE B. SCHNEIBLE CO.

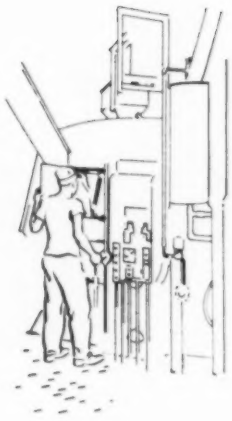
P. O. BOX 502—ROOSEVELT ANNEX • DETROIT 32, MICHIGAN

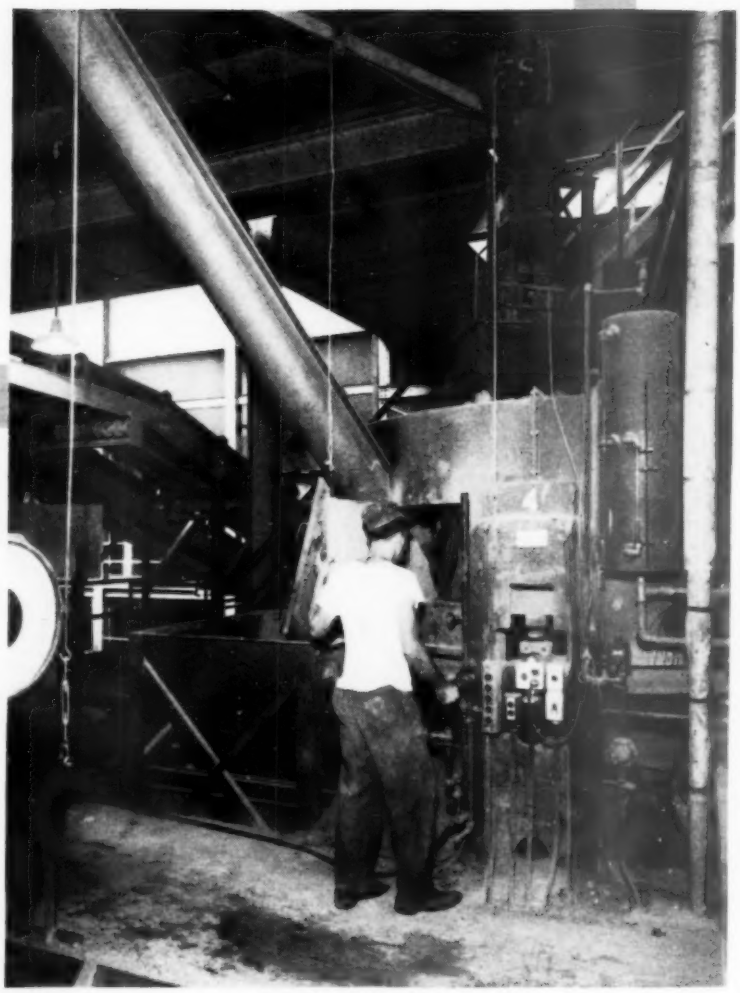
SCHNEIBLE

FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION INC. MEMBER FEMA

PERFECT SAND PREPARATION CAN BE AUTOMATIC

with a *Clearfield Mixer*





Any Clearfield Mixer can be made completely or partially automatic by the addition of suitable time control apparatus. Thus you can substitute a predetermined, uniform procedure for the individual judgment of the operator, controlling minutely the length of tempering, the quantity of bond and all other factors. The result is consistent uniformity in the characteristics of your sand, one of Clearfield's many outstanding services.

For any sand preparation need there's a Clearfield Mixer. Write today for Catalog No. 79 for complete details.

CLEARFIELD
MACHINE COMPANY

CLEARFIELD
PENNSYLVANIA, U.S.A.

One of nine No. 920 Clearfield Mixers, all equipped with automatic controls, located in a large Eastern industrial plant.

A REPORT TO FOUNDRIES

Malleabrasive® *

(SHOT and GRIT)

cuts blast cleaning costs IN HALF!

Use Pangborn's free ABRASIVE ANALYSIS SERVICE!

Pangborn Service Engineers are skilled specialists, backed by Pangborn's 46 years' experience with blast cleaning and as pioneers with metallic abrasives. These men can tell you which size Malleabrasive will save you the most money for your type of work. Ask for a free recommendation. In your letter just tell us what you clean and the type of equipment you use.

Here's Proof! Scores of case histories in Pangborn's files prove Malleabrasive cuts blast cleaning costs in half! For more than 10 years Malleabrasive has been tested, accepted and used by leading foundries from coast to coast . . . and reports like these are typical:

FOUNDRY "A" cleans gray iron castings. A change to Malleabrasive saved them 51.8% on blast cleaning, produced cash savings of $2300 a machine annually and increased production 25%!

FOUNDRY "B" cleans forgings. When they switched to Malleabrasive, cleaning costs were reduced by 58.9%, cash savings per machine averaged $3700 a year and production jumped 12%!

TEST MALLEABRASIVE in your plant—you'll recognize it in the handy orange striped 100-lb. bags. We'll send you all the necessary data. Remember, Malleabrasive is *guaranteed* to outperform conventional abrasives when these comparative tests are properly made. Write for your free TEST KIT today! Address: PANGBORN CORPORATION, 1400 Pangborn Blvd., Hagerstown, Md.

Look to Pangborn for the Latest Developments in Blast Cleaning and Dust Control Equipment

Pangborn

BLAST CLEANS CHEAPER with the right equipment for every job

*U. S. Patent #2184926 (other patents pending)

THER-MONIC

THER-MONIC
INDUCTION HEATING CORP. NEW YORK

NEW DEVELOPMENTS IN ELECTRONIC HEATING!

NEW THER-MONIC CORE BAKING TUNNEL BAKES 133 LBS. OF SAND CORES PER MINUTE, FROM START TO FINISH!

The Ther-monic core baking process makes it possible to reduce handling and breakage. Cores up to 20" x 60" in any length are baked evenly throughout, with no green centers. The Ther-monic process achieves a finer core finish, eliminates over-baked and burned surfaces. No cooling period is required . . cores, after leaving tunnel, are immediately ready for inspection and use. Ther-monic baked cores are highly resistant to cracking during the pouring operation—reduce finning to a negligible factor. Write for complete details!

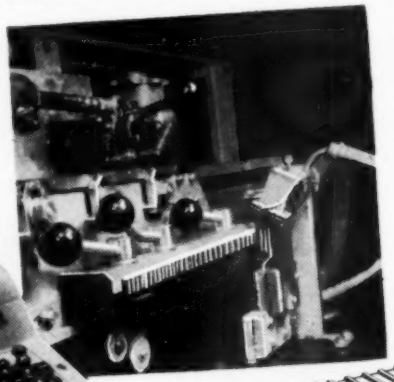
MODEL M7200

Capacity: Four Tons of Sand Cores Per Hour

Overall dimensions of Conveyor and Electrode Housing: 8' x 8' x 32'

NEW THER-MONIC TECHNIQUE SOLVES RACK GEAR HARDENING PROBLEM FOR IBM

Section of semi-automatic work table developed for I.B.M. Operator simply places rack gear in this specially designed indexing fixture . . . presses start button! Subsequent operations are automatic!



PROBLEM: Many approaches to hardening the teeth of special rack gears for IBM Electric Typewriters were unsatisfactory because they required costly straightening operations to correct distortion.

SOLUTION: Ther-monic's newly developed Induction Hardening Technique and equipment.

RESULTS: No rejects! No distortion! . . . And, straightening operations were practically eliminated.

SUGGESTION: You, too, may have a difficult hardening problem. Our engineers will be happy to work out a solution.

INDUCTION HEATING CORPORATION

181 WYTHE AVE., BROOKLYN 11, N.Y.

SLAG HOLE BLOCKS LAST LONGER when made of Norton Crystolon* Refractory because the more dense bonded silicon carbide grain resists slag action either by corrosion or erosion.

NO SOFTENING OR SPALLING AT TEMPERATURES UP TO 3050°F!

That's one big advantage you get when you use Norton Crystolon* slag hole blocks in your back-slagging cupolas. Made of densely bonded, chemically inert silicon carbide grain, they resist the corrosion, erosion and penetration of slag 5 to 15 times longer than fire clay blocks.

Give yourself this *extra* assurance of getting all the way through your campaign without stopping to replace your slag hole block.

Compare!

Yes, compare Norton Crystolon slag hole blocks with whatever you're now using. Chances are you, too, will get longer runs before replacement. For prices or more information, contact your nearby Norton representative or write us direct. NORTON COMPANY, WORCESTER 6, MASS.

NORTON

TRADE MARK REG. U. S. PAT. OFF.

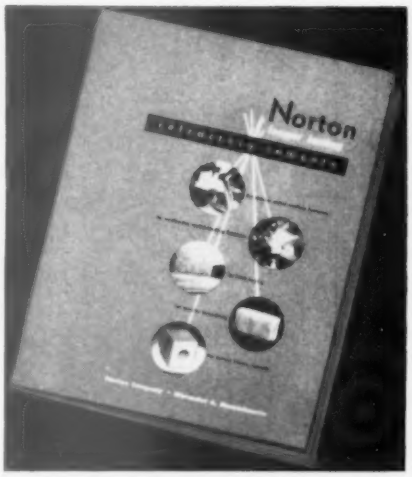
Making better products to make other products better

Special REFRACTORIES

Canadian Representative

A. P. GREEN FIRE BRICK CO., Ltd. TORONTO, ONTARIO

Up-To-The-Minute Facts About Refractory Cements



"The most helpful bulletin on refractory cements ever published"

That's the opinion of the foundry and furnace men who have read this new Norton bulletin. Compiled after exhaustive laboratory and field tests by Norton refractory engineers, this bulletin covers the entire subject of Norton cements with charts, drawings and detailed instructions.

Selection charts

If this bulletin contained nothing but its two selection charts, it would be well worth sending for. At a glance, you know the right cement for various metal-melting furnaces, for brick laying, for resistor imbedding, for burner blocks and tunnels.

"How To" Instructions

Other subjects covered by this booklet include correct preparation, proper installation, drying and maturing . . . all the do's and don'ts that add up to longer-lasting cement applications.

Write for bulletin 863

NORTON COMPANY

301 NEW BOND STREET

WORCESTER 6, MASS.

* Trade-Mark Reg. U. S. Pat. Off. and Foreign Countries

SPENCER
HARTFORD

IN THE FOUNDRY

The first Spencer Turbo was installed on a cupola in Pittsburgh more than forty years ago, and is still giving satisfactory performance.

As foundry practice improved and became more exacting, the advantages of the Spencer Turbo for foundries became more and more important. Its very simplicity and freedom from shut downs and maintenance for instance became most valuable during the war years when foundries were working at top speed 24 hours a day.

The Spencer Turbo has wide clearances, with only two bearings to grease. It operates quietly, at low speeds and with little vibration. No special foundations are required.

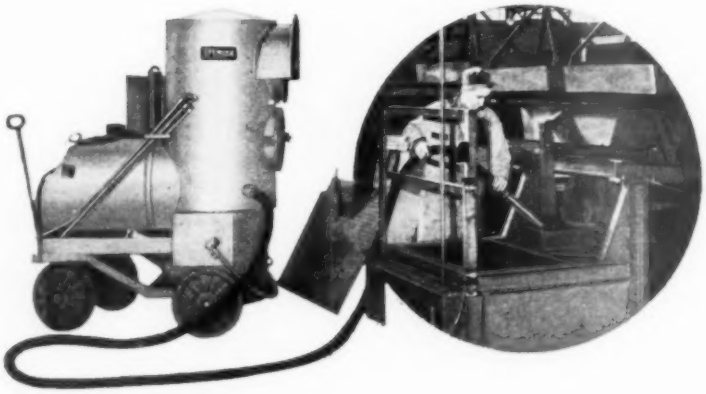
Positive Control: Spencer Turbos deliver a constant pressure of air regardless of cupola loading conditions. Manual control consisting of a calibrated ammeter and a blast gate is standard. Automatic air-weight control with chart readings can be added where required. Ask for the Spencer Foundry Bulletin No. 112.

A Mechanized Foundry Benefits Everyone

FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION INC. MEMBER FEMA

GOOD HOUSEKEEPING

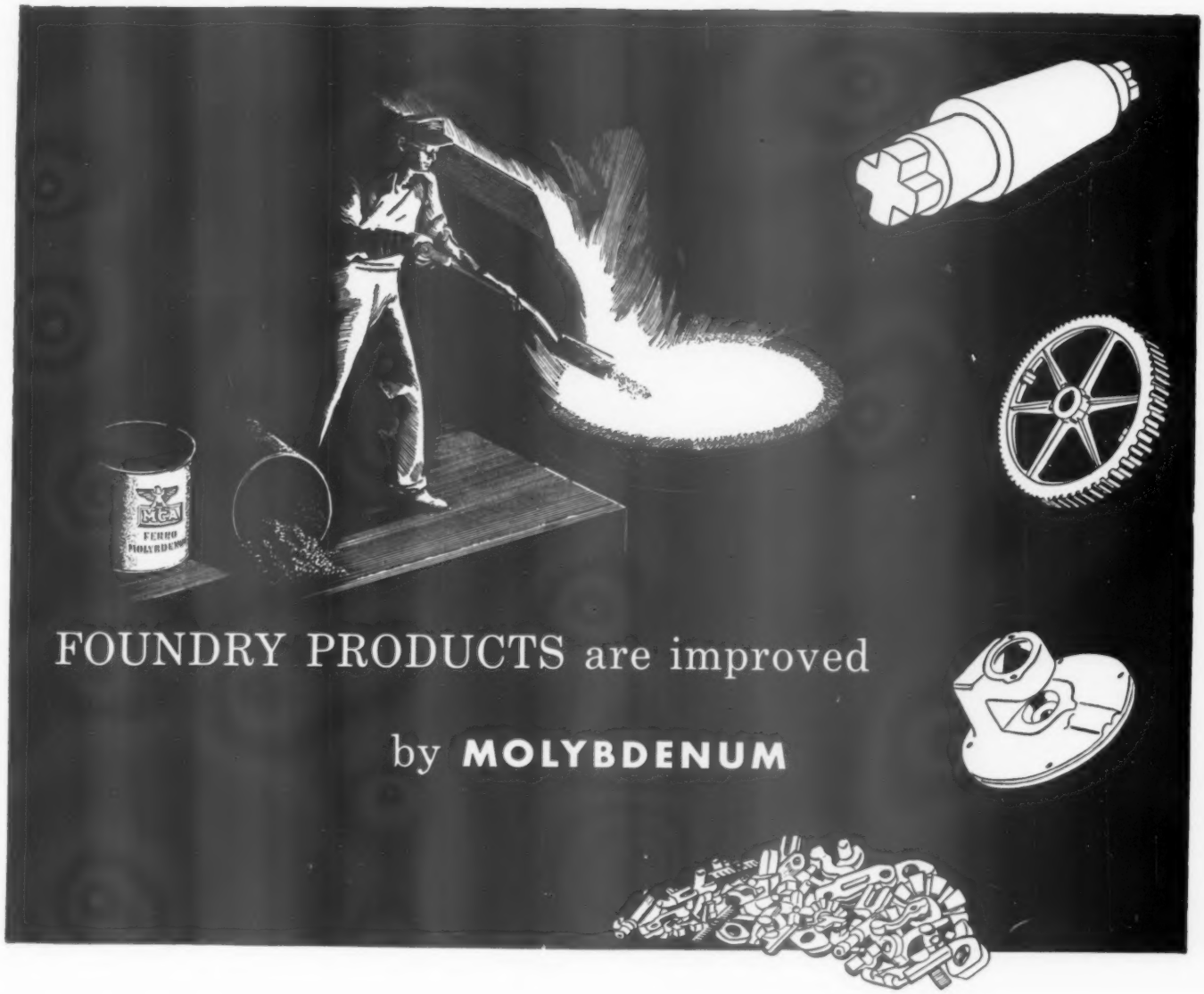
Spencer Portable Vacuum Cleaners from 1½ to 7½ horsepower are used extensively in foundries to remove overhead dirt and dust and to clean molds, patterns and finished castings. The same machine can be used in other parts of the plant for general housekeeping, or for reclaiming metals, material handling and a hundred other uses along the production line. Bulletins on request.



THE SPENCER TURBINE COMPANY • HARTFORD 6, CONNECTICUT

SPENCER
HARTFORD

414A



Where high strength is required, and especially strength at high temperatures . . .

Where uniform strength in light and heavy sections is important . . .

And where economy of weight, dimension, or basic materials is a ruling consideration . . .

Molybdenum is entering more and more into the composition of modern castings.

A wide range of physical properties is obtainable by heat treatment.

Advanced formulas and foundry procedures make a little Molybdenum go a long way.

The Molybdenum Corporation, as a supplier of Molybdenum, Tungsten and Boron, is glad to be consulted by any user of these products.

AMERICAN Production, American Distribution, American Control, Completely Integrated.

Offices: Pittsburgh, New York, Chicago, Cleveland, Detroit, Los Angeles, San Francisco, Seattle.

Sales Representatives: American Steel and Supply Co., Chicago; Edgar L. Fink, Detroit, Brumley-Donaldson Co., Los Angeles, San Francisco, Seattle.

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Works: Washington, Pa.; York, Pa.

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MOLYBDENUM CORPORATION OF AMERICA
GRANT BUILDING PITTSBURGH, PA.

MCA

NOW THE MOST WIDELY USED METHOD FOR CUPOLA HEATING

ROSS HOT BLAST HEATING SYSTEM

SAVE COKE

INCREASE MELT

HIGHER TEMPERATURE

AVOID BRIDGING

LESS SILICONE & MANGANESE LOSS

MORE CARBON PICK-UP

QUICK START-UP

saves enough to pay its entire cost in remarkably short period of time

It's simple! Burns oil or gas and raises temperature of cold air from your blower to 450 deg. F. for delivery to cupola.

It's effective! Note the seven definite results produced—the improved operating advantages — the sizable savings in coke, labor and materials in cleaning, patching, etc.

It's economical! Installed without any interference to your melting schedule. Operates with your present blowers. Pays for itself quickly out of saving secured.

Contact our nearest office for full particulars with respect to your particular operating conditions.

ROSS SYSTEMS

J. O. ROSS ENGINEERING CORPORATION

MANUFACTURERS OF AIR PROCESSING SYSTEMS

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ROSS ENGINEERING OF CANADA, LTD., MONTREAL 19, CANADA • CARRIER-ROSS ENGINEERING CO., LTD., LONDON, ENG.

SMOOTH *Sailing*

WITH

SMITH L-O CORE OIL

Foundrymen who have "swung" to Smith L-O Core Oil find there is smooth sailing all along the production line. From core room to shakeout, Smith L-O superiority and dependability comes through to help produce sound, accurate castings — the type of castings that result in greater profits. If you want a core oil that does a top-notch job, use Smith L-O . . . controlled for uniformity by the Dow-Therm method of heat treatment.

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In The Following Cities

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- PACIFIC GRAPHITE CO., INC. Los Angeles 22, California
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- WESTERN FOUNDRY SAND CO. Seattle, Washington
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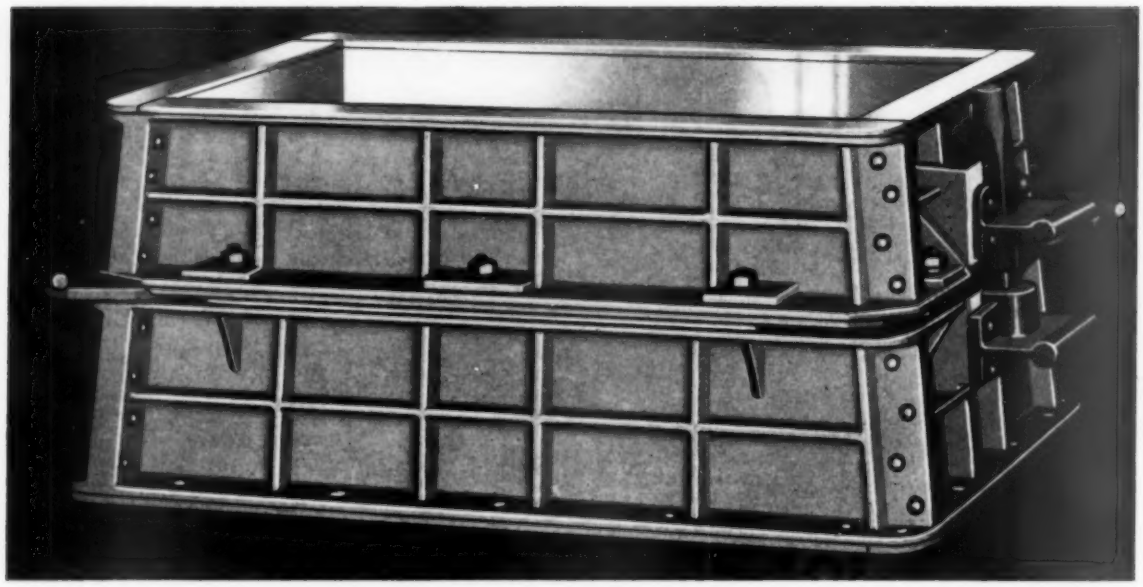
Smith L-O Core Oil

ROD DIP LIQUID PARTING

SMITH OIL & REFINING CO.

MANUFACTURERS OF L-O AND CERTIFIED CORE OILS

INDUSTRIAL OILS DIVISION . . . ROCKFORD, ILLINOIS



Flask Equipped with ¾" Square Pins.
Several Types Of Pins To Choose From

50%

Increase in production is reported by a large midwest producer of Lawn mower castings, after installing "Diamond Featherweight magnesium flasks".

50% more molds per floor with less fatigue to the molder was attained.

Strong and light in weight, The Diamond Featherweight is the fastest and easiest operated flask on the market.

Fast operating sand strip releases flask with ease from the mold.

No clogging with sand, and no sand hanging in the corners.

The ideal production flask for all foundries.

We also manufacture a complete line of Wood Flasks, both snap and slip. Steel and Aluminum Jackets, steel and aluminum core plates, steel and aluminum bottom boards.

DIAMOND

Telephone 2-2553 **CLAMP AND FLASK COMPANY** **Richmond, Indiana**

Designers of* CORE PLATES, JACKETS, BANDS, FLASKS *since 1889

FREEMAN *Dowmetal* PATTERN PLATES

All Plates Shipped Same Day Order is Received

TRY THEM FOR
COPE AND DRAG MOUNTINGS

FREEMAN DOWMETAL PLATES COST LESS

For years many foundries have used FREEMAN PATTERN PLATES as they are LIGHTER, STRONGER and IMMEDIATELY AVAILABLE in ANY SIZE AND QUANTITY. Surfaces are held to CLOSE PARALLEL TOLERANCES and plates are of UNIFORM THICKNESS.

With their clean VELVET FINISH, plates are received in proper condition for mounting patterns. Drilling, tapping and NECESSARY MACHINING to mount patterns is DONE MORE EASILY on free-cutting DOWMETAL PATTERN PLATES.

For regular pattern or cope and drag work, we can furnish ANY PRACTICAL SIZE 5/16"—3/8"—1/2"—5/8"—3/4"—1" THICKNESS. When ordered by flask size, we allow 1" for flask and 2-1/2" on each end for pins and ears. If square or rectangular plates are desired, specify overall size and thickness. For special shapes send a template or sketch. LITERATURE AND PRICE LIST AVAILABLE.

THE FREEMAN SUPPLY CO.

Pattern Shop and Foundry Supplies and Equipment
Mahogany and Pine Pattern Lumber
1152 E. BROADWAY TOLEDO 5, OHIO

DAIRY PLANT OPERATORS DEMAND....

Nickel Silver Castings for Appearance, Economy, Resistance to Corrosion

Pump casings, impellers, fittings and numerous parts for milk separators and sanitary pumps are cast in Nickel Silver. Users of Nickel Silver for these parts make this wise selection because they know that sanitation . . economy . . corrosion resistance and appearance are combined in this material.

Many state food codes include Nickel Silver alloy requirements in those phases of food processing where these qualities are required . . for experience has proved that Nickel Silver castings reign supreme.

Specify—LAVIN NON-FERROUS INGOT—*Quality*

R. LAVIN & SONS, INC.

Refiners of Brass, Bronze and Aluminum

3426 SOUTH KEDZIE AVENUE · CHICAGO 23, ILLINOIS

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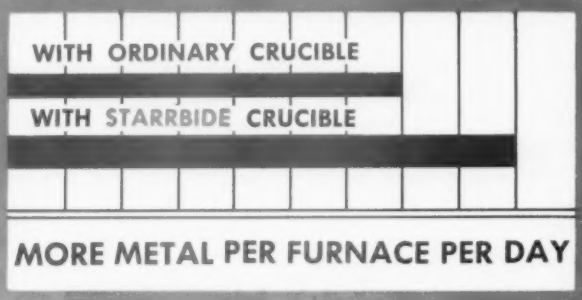
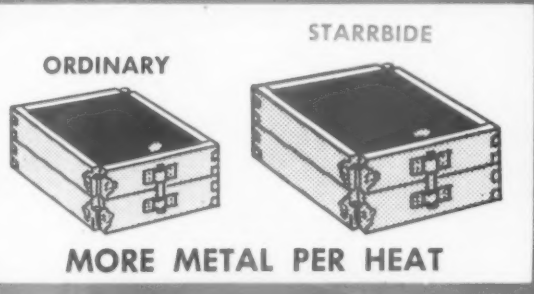
★ **STARRBIDE**

CARBON BONDED SILICON CARBIDE CRUCIBLES

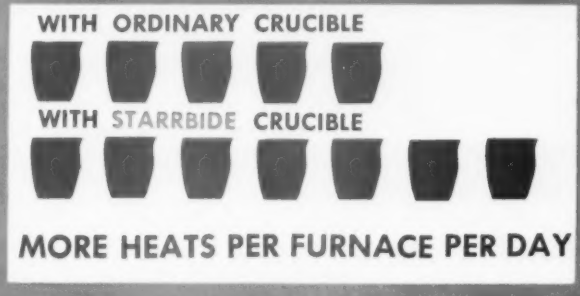
STARRBIDE produces more metal per furnace per day because furnace linings need not be changed to accommodate a larger melt than the conventional crucible would handle.



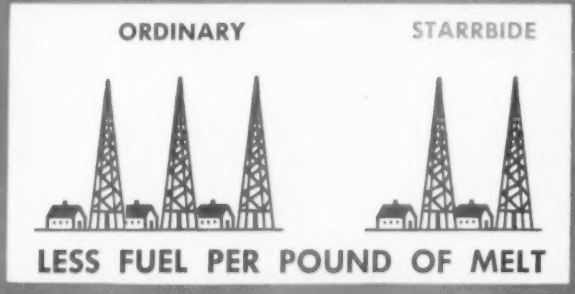
STARRBIDE provides more metal per heat because its new, scientific wall design increases the amount of metal a given size of crucible will hold.



STARRBIDE provides more heats per furnace per day because the wall design affords a faster heat exchange.



STARRBIDE decreases the cost of fuel per pound of melt since the source of heat is closer to the metal.



STARRBIDE crucibles are lighter, easier to handle. They will suffer less from damage in transporting to and from storage.

AMERICAN CRUCIBLE COMPANY

NORTH HAVEN • CONNECTICUT • U. S. A.

Whether it's

. . . performance will be BETTER with FRONTIER 40-E ALUMINUM ALLOY

● FRONTIER 40-E is a non-heat-treated aluminum alloy with special properties which make it adaptable to a wide variety of industrial and commercial applications. Not only does it offer such advantages as better machineability and greater resistance to shock and corrosion, but also it gives the user assurance that *the same high qualities which show up in the test bar will appear uniformly throughout a large casting.*

Here are some of the outstanding applications of FRONTIER 40-E ALUMINUM ALLOY

Aircraft Parts and Equipment
"C" Clamps
Chain Hoists Parts
Cylinder Heads
Dairy & Food Processing Equipment
Die Holders for Stamping Machines
Electrical Conduits and Fittings
Electric Motor Housings
Fire Fighting Equipment
Gun Turrets
Industrial Cases and Covers
Jet Engine Castings
Lawn Mower Parts
Omnibus Equipment
Optical and Microscopic Instruments
Pipe Wrenches
Pistons
Radar Equipment
Radiator Shells
Railroad Jacks
Snatch Blocks
Tappet Guides
Textile Castings
Trailers—Wheels & Accessories
Truck Axles
Valves and Connectors
Ventilating and Heater Fans

Remember—if aluminum can do it better—FRONTIER 40-E Aluminum Alloy can do it BEST! . . . Don't be fooled by aluminum alloy imitations.

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Bulletin on SUPER REFRACTORIES

by CARBORUNDUM
TRADE MARK

NO. 9 SEPTEMBER, 1950

What Are the Fields of Application for Super Refractories?

Super refractories by CARBORUNDUM have been used with excellent results in a wide range of industrial kilns and furnaces and for certain other specialized applications. They have demonstrated that, wherever refractories are used, it is possible that *super refractories* may be profitably adapted to specific areas of recommended usage.

However, in spite of their wide range of use, there is no pat formula for application — each new installation must be considered individually. Service requirements vary so between units, that even comparable furnaces may develop conditions demanding the use of different super refractories. Actual selection of super refractories can be based only on the specific operating conditions involved.

The field of application for super refractories is limited only by the economic justification of their cost. In some installations they are used to implement other refractories to improve overall life. In still other cases they may completely replace common refractories to increase production, improve quality of work and even make new processes possible.

At the right are some of the applications in which their special properties are used to good advantage.

Physical Properties of Super Refractories by CARBORUNDUM
Trade Mark

	CARBOFRAX Silicon Carbide	MULLFRAX Electric Furnace Mullite	MULLFRAX S Converted Kyanite	ALFRAX K	ALFRAX B	ALFRAX BI
				Electrically Fused Alumina		
Heat Conductivity at 2200° F. in BTU/hr. sq. ft. and °F./in. of thickness	109 BTU	16 BTU	9 BTU	24 BTU	12 BTU	7 BTU
REFRACTORINESS PCE CONE	37-40	38-39	37-38	37-39	39-40	38-39
SPALLING RESISTANCE	High	High	High	Good	Good	Good
ABRASION RESISTANCE	High	Medium	Medium	High	Medium	Low
THERMAL EXPANSION (25° — 1400° C.)	.0000044	.0000059	.0000069	.0000074	.0000086	.0000086
MODULUS OF RUPTURE @ 2460° F. PSI	800-3125	100-250	175-475	100-1050	100-225	50-100
WEIGHT 9 IN. STRAIGHT	9.25 lbs.	9 lbs.	8 lbs.	10.1 lbs.	7.25 lbs.	4.8 lbs.

Some of the Applications For Super Refractories

Acetylene manufacturing furnaces
Activated carbon retorts
Air furnaces
Aluminum melting furnaces
Annealing furnaces
Assay furnaces
Baking ovens
Billet heating furnaces
Boiler settings
Bone char revivification furnaces
Brass melting furnaces
Butadiene manufacturing furnaces
Cadmium retorts
Carbon brush furnaces
Carbon black furnaces
Carbon monoxide furnaces
Carbon dioxide furnaces
Carburizing furnaces
Cement kilns
Ceramic kilns
Coal gas benches
Cobalt retorts
Copper melting and refining furnaces
Crucible melting furnaces
Cupolas
Electric furnaces
Enamel frit furnaces
Forging furnaces
Gas producers
Gas generators
Glass tanks
Glass lehrs
Gold smelting furnaces
Heat treating furnaces
Hydrocarbon cracking furnaces
Hydrogen manufacturing furnaces
Incinerators
Ladles
Lime kilns
Lithopone kilns
Malleable annealing furnaces
Magnesium reduction furnaces
Muffle furnaces
Muriatic acid furnaces
Oil refining stills
Oleum manufacturing furnaces
Open hearth furnaces
Phosphate furnaces
Porcelain enameling furnaces
Pottery kilns
Recuperators
Regenerators
Reheating furnaces
Retorts
Reverberatory furnaces
Rock wool furnaces
Rotary kilns
Slag wool furnaces
Smelting furnaces
Soaking pits
Styrene manufacturing furnaces
Sulphur burners
Tunnel kilns
Varnish fires
Welding furnaces
Zinc distillation
Zinc refining
Zinc retorts

"Carborundum," "Carbofrax," "Mullfrax," "Silfrax," "Alfrax" are registered trademarks which indicate manufacture by The Carborundum Company

Address all correspondence to: Dept. A-90, THE CARBORUNDUM COMPANY, Refractories Division, Perth Amboy, New Jersey

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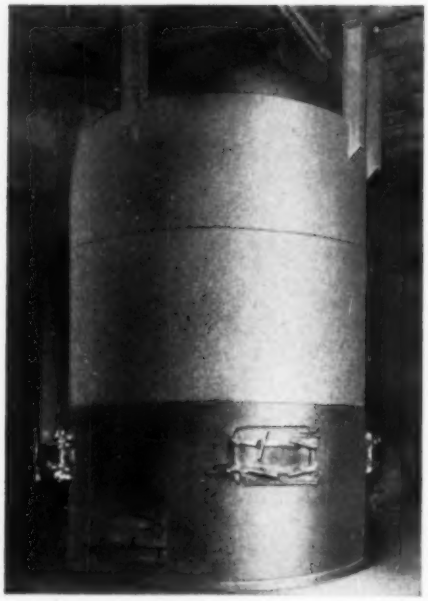
Water Gas Generators — Another Super Refractory Application



Four principal benefits result when water gas generators are equipped with CARBOFRAX silicon carbide linings:

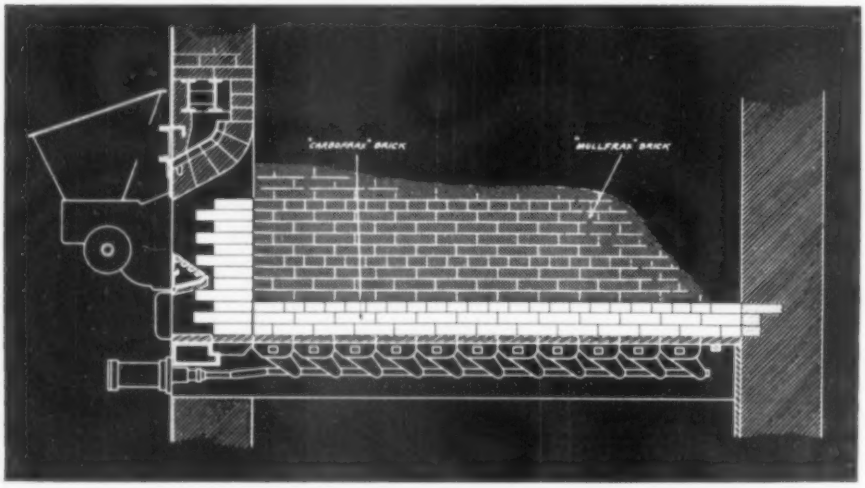
1. Faster and Easier Cleaning: Clinkers do not become embedded in the hard brickwork. Barring off is faster, easier and more complete. Cleaning time is reduced 30 to 50%.

2. Increased set capacity: Shorter cleaning time means units are on the line longer. They stay hotter — get back into production faster. The entire grate and fire area stay clear of clinkers longer. This results in better fuel combustion and increased gas-make.

3. Longer lining life: A service life usually 3, 5 or more times that of ordinary linings. CARBOFRAX brick have high resistance to flame erosion spalling, cracking and mechanical abrasion.

4. Lower operating costs: Repeated repairs and replacements are eliminated. Shorter cleaning periods mean further savings.

The characteristics of CARBOFRAX refractories which have made the foregoing results possible also are used advantageously in producing blue gas and oil gas. These refractories are likewise employed for new gas making and reforming processes.



Boilers, too, Need Super Refractories

Shown here is a typical spreader stoker fired boiler with power operated dump grates. CARBOFRAX silicon carbide brick are used in front, side and bridge walls. Above the CARBOFRAX brick in the side walls, MULLFRAX electric furnace mullite brick are used. The unique properties of these two super refractories effectively minimize maintenance costs, eliminate frequent boiler shut downs, increase steam production and improve combustion conditions.

In the fuel bed zone CARBOFRAX brick help maintain full grate area, by offering little or no footing for clinker accumulations. Whatever clinker build up there is can be easily removed with a slice bar without impairing the face of these hard dense brick. They also resist cut-backs due to their high resistance to flame erosion and mechanical abrasion.

CARBOFRAX piers and arches in the front wall combat the very high temperatures developed here. They withstand erosive action of coal being kicked into the furnace, resist slag penetration, and minimize spalling and cracking to prolong service life.

MULLFRAX brick are installed in the upper walls because of their unique resistance to fluid ash. Their chemical inertness effectively retards erosion. They remain hard at high temperatures, thereby resisting clinker formations and mechanical wear.

This combination of CARBOFRAX and MULLFRAX brick is being used successfully in many types of stoker-fired boiler furnaces.

Super Refractory Ideal for Kiln Furniture

This picture of a vitrified hotel china kiln car superstructure was taken after 80 trips — with no rebuilding. Notice the straight, level CARBOFRAX silicon carbide setter tile. Note, too, the excellent condition of the CARBOFRAX I-beam posts despite the heavy loads carried. Also of interest is the fill obtained with this design of setting.

CARBOFRAX setters with their high hot strength minimize warpage. They stay clean — there is no boiling or blistering. Their unique thermal shock resistance minimizes cracking.

High density and refractoriness of the CARBOFRAX I-beam posts prevent "squatting." "Cornering" also is eliminated. Post life is extended to cut replacement cost and frequency of rebuilds. With a relatively thin web and smaller pads these posts make ware placing easier and faster — increase car pay-load.

Put to work as kiln furniture for various operations, CARBOFRAX setters and posts result in definite economies per piece or per dozen of ware fired.

To obtain facts and figures on installations in specific fields merely select from this list of bulletins. Copies will be sent you at once. No obligation, of course.

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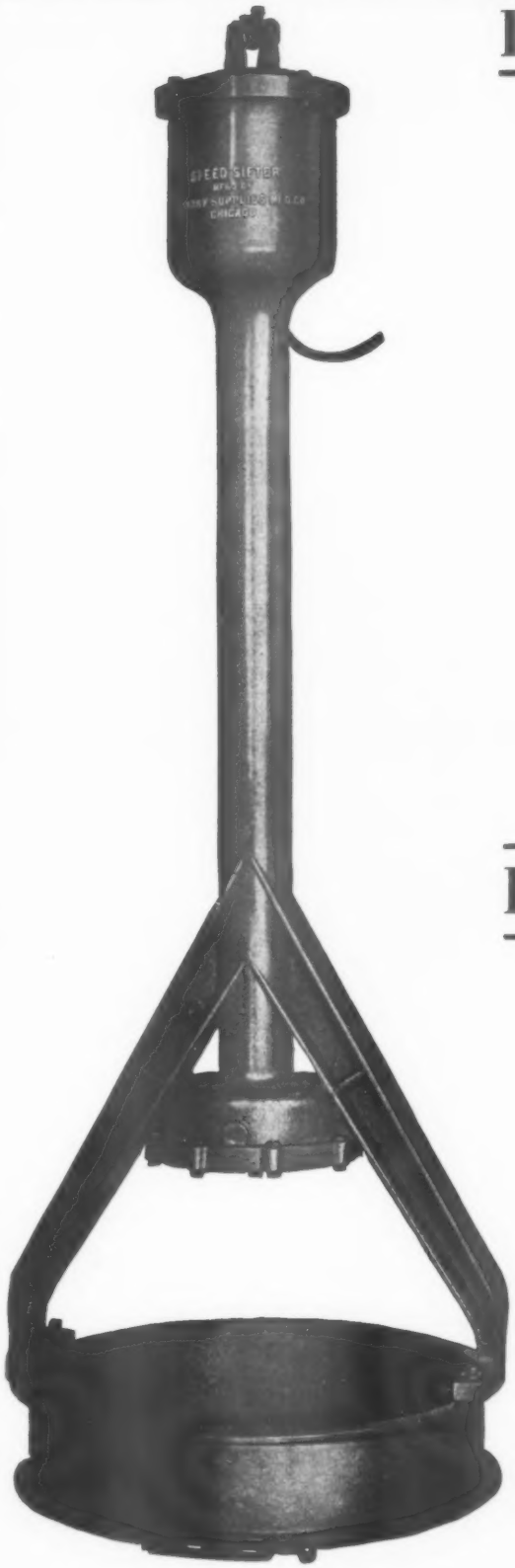

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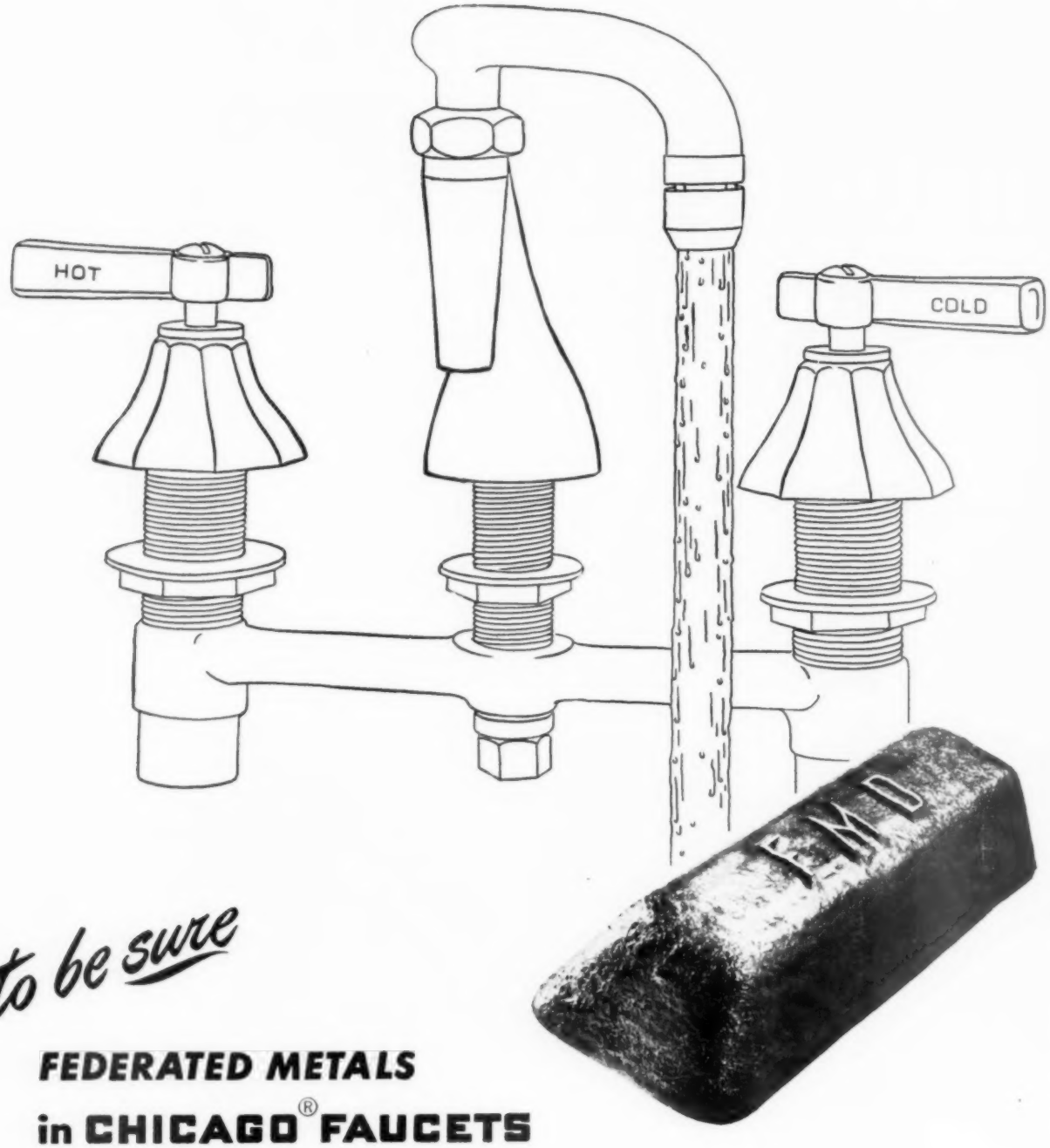

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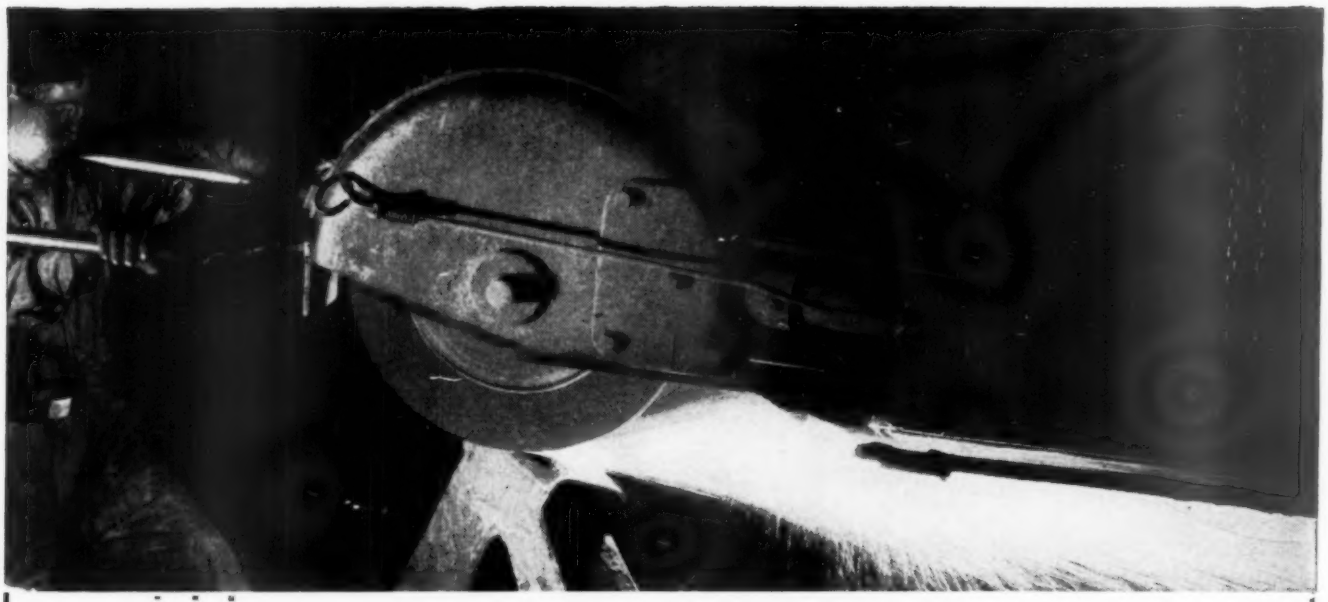

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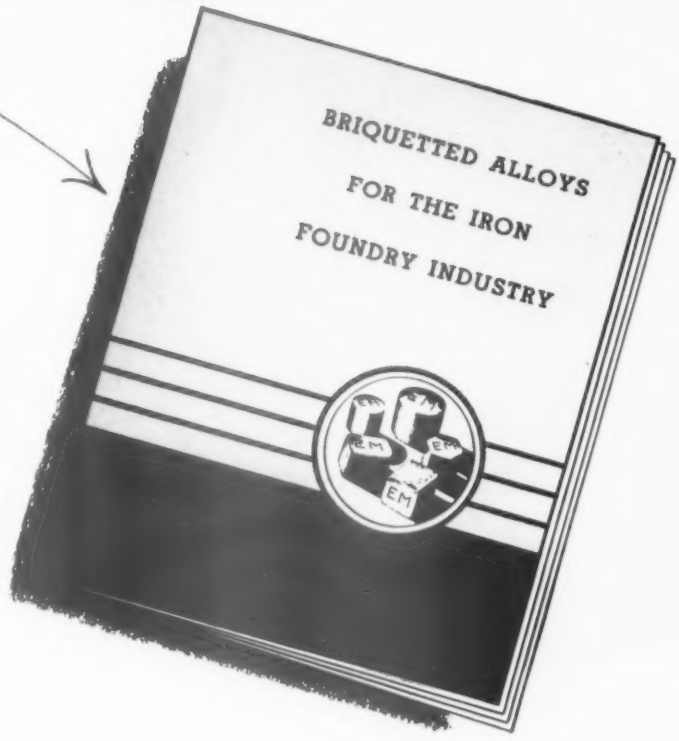

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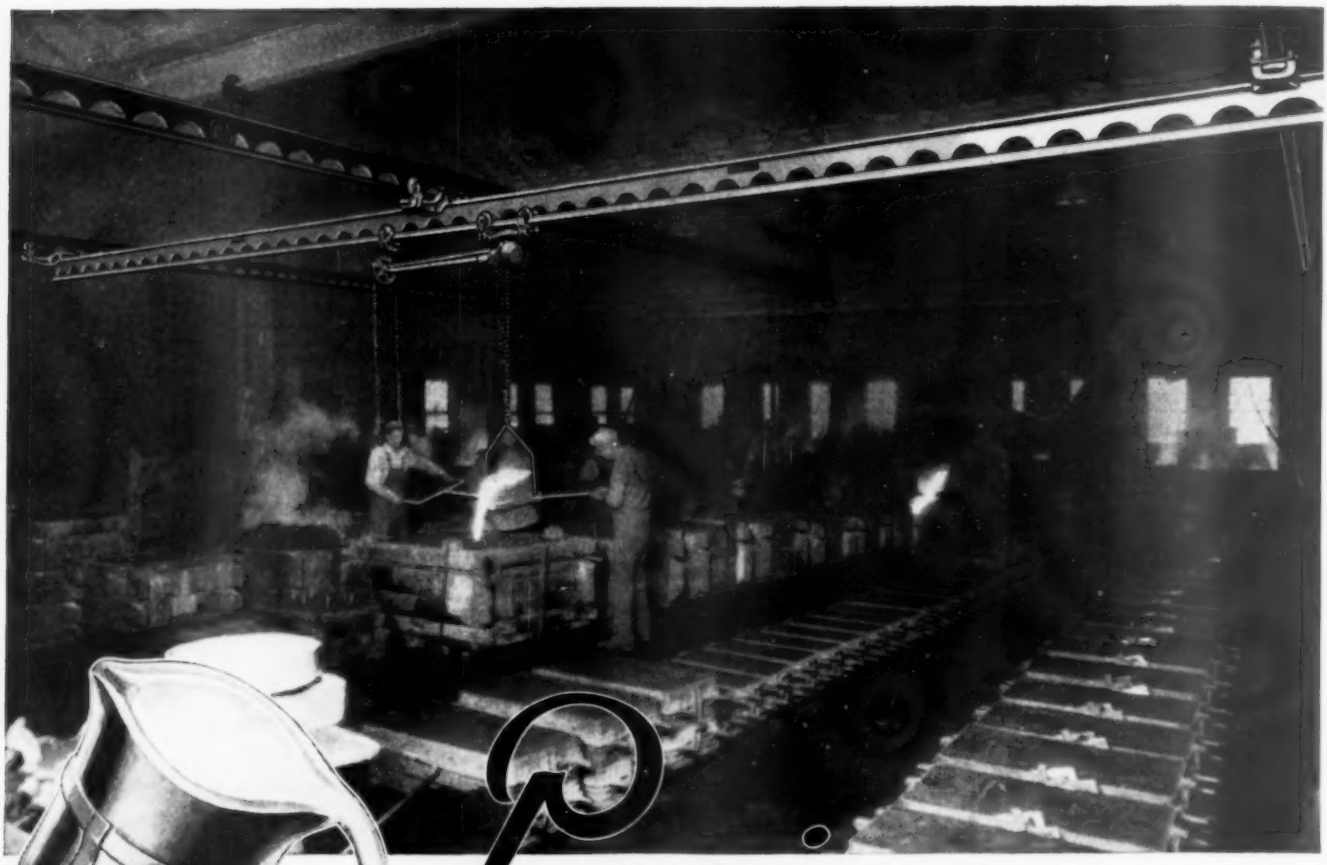

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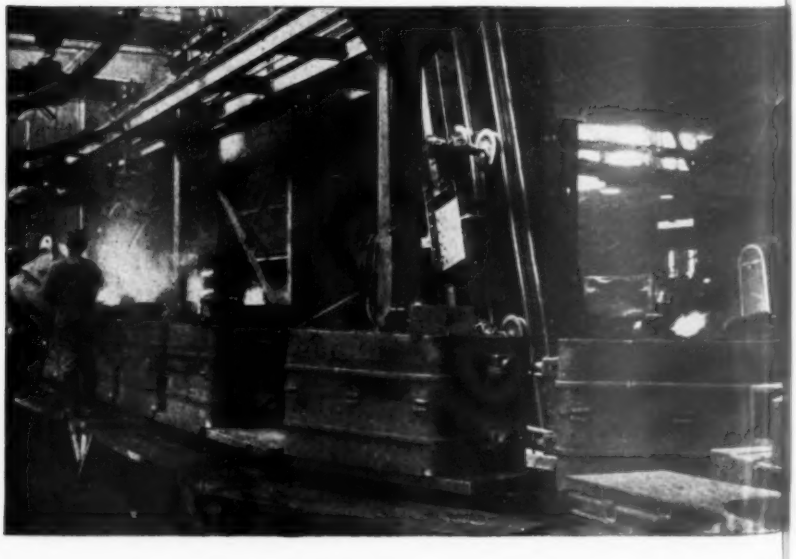


Shortages of Manpower Again Threaten Industry

MANPOWER provided the greatest problem for the foundry industry during World War II. While procurement of raw materials and some supplies required constant effort, shortages of both skilled and unskilled workers placed the greatest burden on those in charge of castings production. Because the manpower problem became especially acute at a time when demand for certain types of castings for the war effort accelerated suddenly, the industry was the target for unfair criticism by uninformed people connected with government procurement.

Unintelligent suggestions from government representatives, such as the famous free beer and pretzel idea of the manpower commissioner in Cleveland, only added to the difficulties which faced management at that time. Ill-advised efforts of several government departments in attempting to help foundries with manpower shortages created problems which have bothered the industry from 1943 to the present.

Shortages of skilled workers stemmed chiefly from three sources. First, lack of uniform draft regulations on a national basis and absence of men with industrial background on a large number of local boards produced many injustices in deferments. Secondly, pirating of labor by the glamour industries or by prime contractors receiving government blessing to pay above the going labor rate in the district depleted the supply of workers from basic producers, such as foundries. Last, but perhaps not least, while the military did recognize the need for steel castings from the beginning, the necessity of having malleable iron, gray iron and nonferrous castings was not realized until over a year after the war started and after many plants had been closed and the workers scattered to other fields.

If foundries are to meet future demands of the military, and at the same time produce castings for at least essential civilian needs, Washington must recognize that manpower controls are as important as the scheduling of materials or the control of wages and prices. The time for consideration of the problem appears short, for already there are reports of recruiting by some hard-pressed industrial areas, and new war plants are being flooded with job seekers. Many of these may remember the soft jobs provided by numerous war plants which, to avoid shortages, hired workers long before actual production could be started.

While the problem is being studied, it would help greatly if General Hershey would provide uniform regulations governing occupations deserving exemptions. Glamour industries and other prime contractors should be prevented from promiscuous recruiting. And surely the recent war should have taught the military planners that many industries, including all types of foundries, will be needed in the production of war materiel.

Frank G. Steinebach
Editor

A Method for Studying

MOLD—METAL

Interface Reactions

The authors describe a method for studying the reaction between molten metal and sand in the mold. This method, in which a steel pin is melted while embedded in a standard sand test specimen, is said to reproduce actual operating conditions and permits determination of the effect of numerous variations in sand mixtures and metal composition

By ROBERT E. SAVAGE
Metallurgist
International Nickel Co. Inc., New York
and HOWARD F. TAYLOR
Associate Professor, Metallurgy Department
Massachusetts Institute of Technology
Cambridge, Mass.

THE surface condition of castings is influenced by the behavior of the molding sand when the molten metal comes to rest against it. The surface smoothness of sand castings is influenced by:

1. The temperature of the metal, which determines the tendency of the metal to flow between and around the sand grains at the "mold-metal interface."
2. The closeness of packing of the sand grains, usually interpreted as *mold hardness* or *density*.
3. The force of the metal impinging upon the sand grains, and the ferrostatic pressure against the mold surface.
4. The expansion characteristics of the surface sand grains—e.g. the tendency of the heated grains of sand at the surface to expand and shear from the adjacent layer.
5. Chemical reactions which may occur at the mold-metal interface; this is particularly important in making steel castings where molten metal temperatures are high.

There are several ways of studying mold-metal interface reactions. The most direct method is to analyze samples taken from molds in which castings are made; however, many variables are involved which cannot be assessed properly and this method proves to be costly and inconvenient.

Dietert[1] used a laboratory method developed by Taylor[2] at the Naval Research Laboratory to study the effect of gas atmospheres, and of materials added to the sand, on the mold-metal interface behavior. In this test a pin of steel is rammed in the center of a standard sand test cylinder 2 in. diameter x 2 in. high. The cylinder and pin are then heated in a furnace at various temperatures and for various times. The pin oxidizes and forms a sintered sand layer which resembles exactly the sintered layer, or "peel," from a large steel casting made in a sand mold. By changing the condition of testing systematically and observing the sintered layer next to the pin in each case, interesting qualitative conclusions can be drawn.

Many experiments can be made in the laboratory, cheaply and easily, as compared to the more cumbersome method of shop heating. Caine[3, 4] used several different methods for studying mold-metal interface behavior. Probably the most encouraging was one in which standard 2 x 2-in. test cylinders of sand were fastened to a long metal rod; the specimen was then

This paper is part of a thesis for a Doctor of Science Degree at Massachusetts Institute of Technology, Cambridge, Mass.

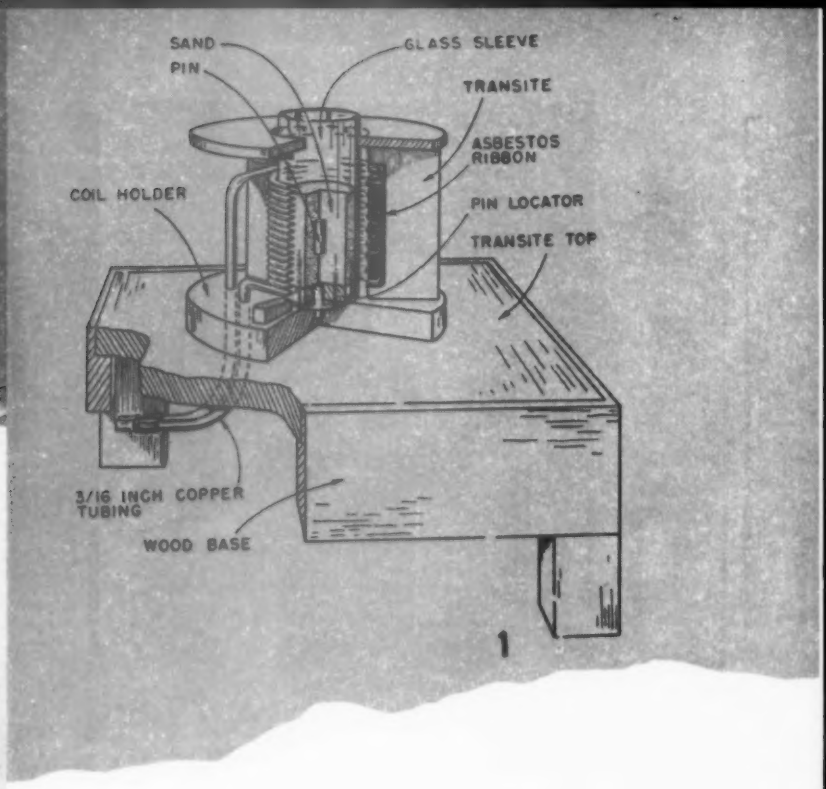


Fig. 1—Schematic sketch of induction furnace used in tests. Method of inserting mold shown in Fig. 2

immersed in molten steel for various times and under various conditions.

In spite of their practical utility there are serious limitations to Taylor's and Caine's tests. In the former: (1) the metal pin was not melted; (2) the pin was heated by the sand, while in practice the metal heats the sand, and (3) no quantitative proof was obtained that the test gave the same results as found in practice. Caine's test was: (1) also not quantitative; (2) somewhat inconvenient, in that molten steel had to be provided, and (3) conditions were not completely reproducible.

Among the types of information obtainable by pin testing are these:

1. The effect of time, temperature and atmosphere on the rate and nature of interface reactions.
2. The effect of sand grain size and distribution upon casting surface.
3. The utility of sand additives such as iron oxide, cereal flour, etc. for improving the surface finish of castings.
4. The effect of various mold materials and methods of preparation on the tendency of the metal to pick up gases.
5. The relative tendencies of the different compositions of metals to promote interface reactions, metal penetration, or other phenomena.

A limited number of tests have been made on some of these variables, and these will be described.

Test Developed—As in the original pin test a steel pin was rammed or placed inside a sand mold; this time the pin was heated to melting by induction to provide conditions closer to actual practice. The induction furnace is shown schematically in Fig. 1 and by photograph in Fig. 2. The glass sleeve protected the copper coils from water vapor when green (undried) sand molds were used. The steel pin acted as secondary coupling to the primary high-frequency coil. The sand was heated by absorbing the heat generated in the pin.

In detail, the test specimen consisted of an 18-gram metal pin ($\frac{1}{2}$-in. diameter x $\frac{3}{4}$-in. height) embedded in a 200-gram sand mold (2-in. diameter x $2\frac{1}{2}$-in. height). The test piece and method of preparing it are shown in *A*, *B* and *C* of Fig. 3. To determine melting times and temperatures obtained, platinum 10 per cent rhodium thermocouples were attached to the surface of the pins, or placed in holes drilled into the pin (*A* and *B* of Fig. 4).

An Acco high-frequency convertor was used to produce the high-frequency current necessary to melt the metal pins quickly. By regulation of the power output, the pins could be heated at different rates. Typical heating curves for a high frequency output of 103

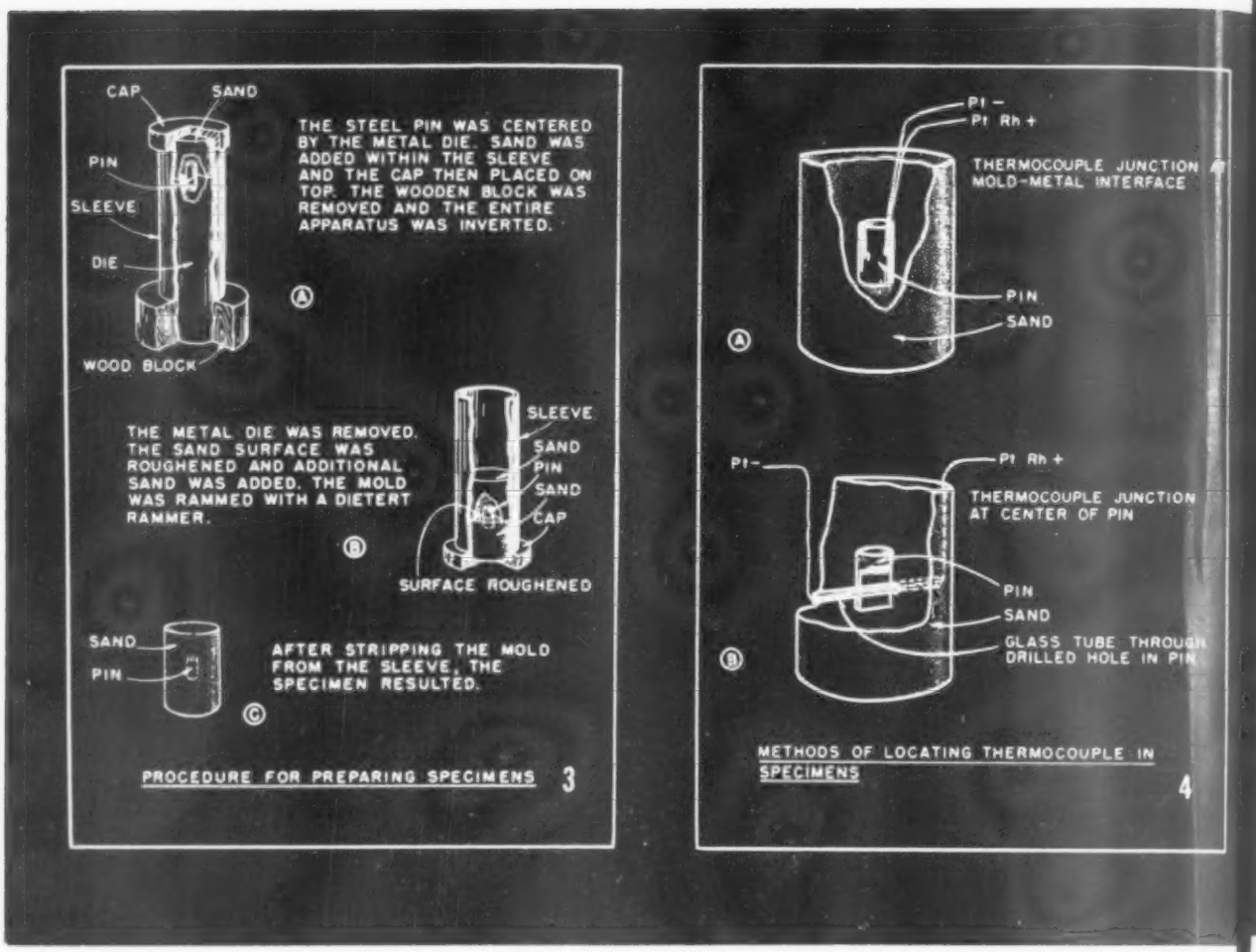


Fig. 6—Effect of Variations in Heating Time

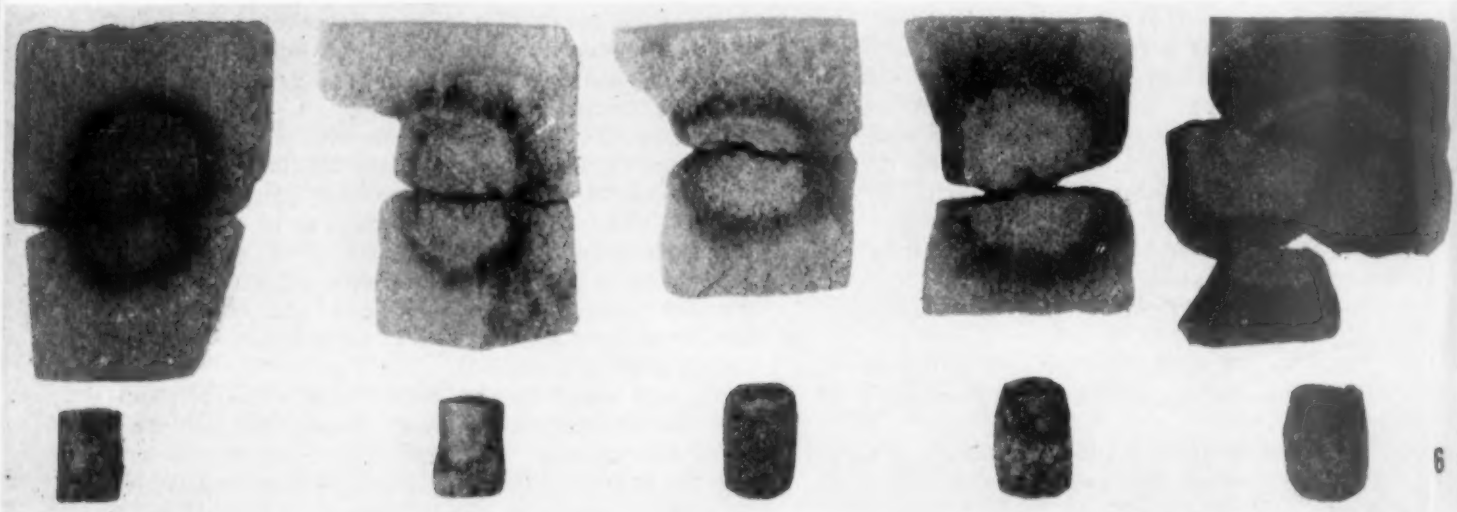
Specimen Number	Heating Time in Minutes
1A	½
1B	1
1C	1½
1D	2
1E	2½
1F	3½
1G	4½

Test Conditions: High-frequency amperes, 103-5. Number of rams, three. Atmosphere, air.

Pin Type: 1040 steel.

Sand Characteristics: Type, silica round grains. Grain size, U. S. screen number +40-30. Dry sand mold. Sand additions, 3 per cent bentonite, 3 per cent water.

to 105 amperes are given in Fig. 5. The curves show an initial rapid rise in temperature and level off at the melting point of the test pin. In all cases, the time required to reach the melting point of the pin was approximately 1.8 minutes. Temperatures at the interface could not be followed for times greater than 2.5 minutes with a platinum, platinum-rhodium thermocouple, since the thermocouple readings became er-



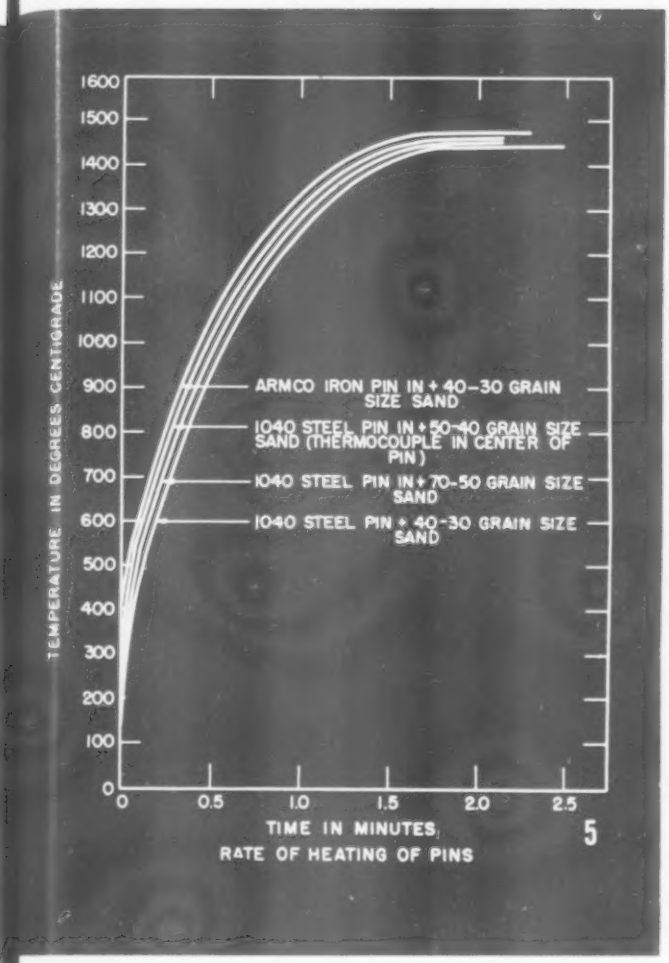


Fig. 3—Procedure followed in preparing specimens

Fig. 4—Methods of locating thermocouple in molds

Fig. 5—Rates at which the metal pins were heated

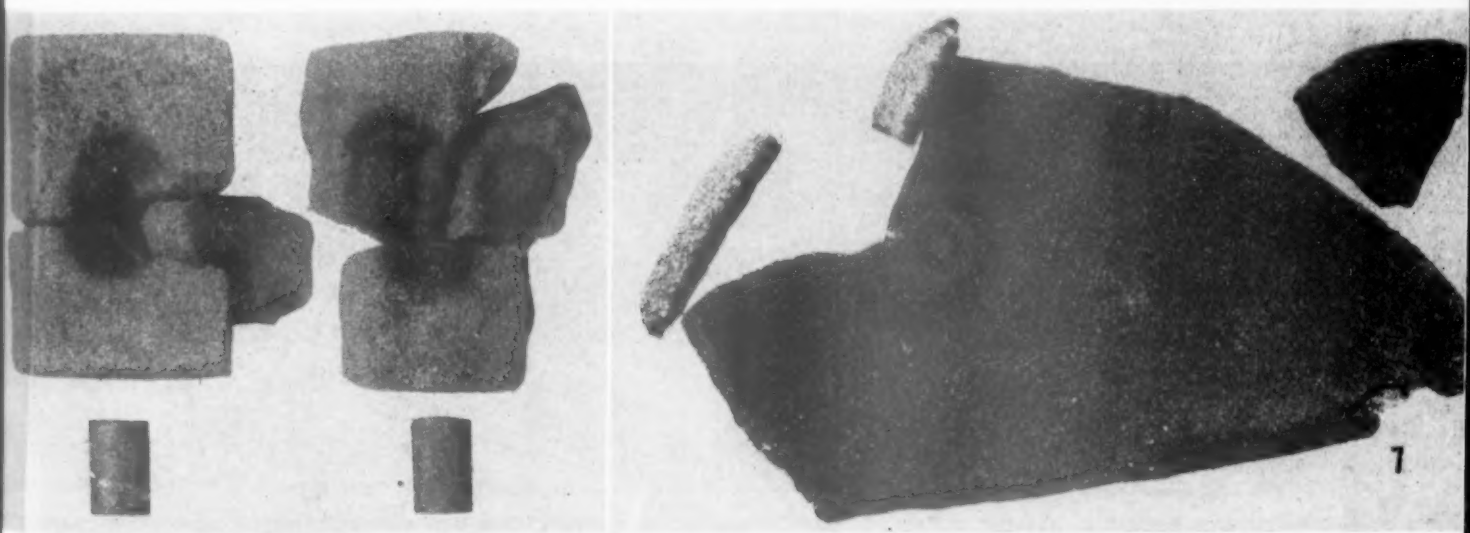
ratic at longer times. Temperatures at times greater than 2.5 minutes were taken with an optical pyrometer and were checked against thermocouple measurements in the range where both instruments were usable.

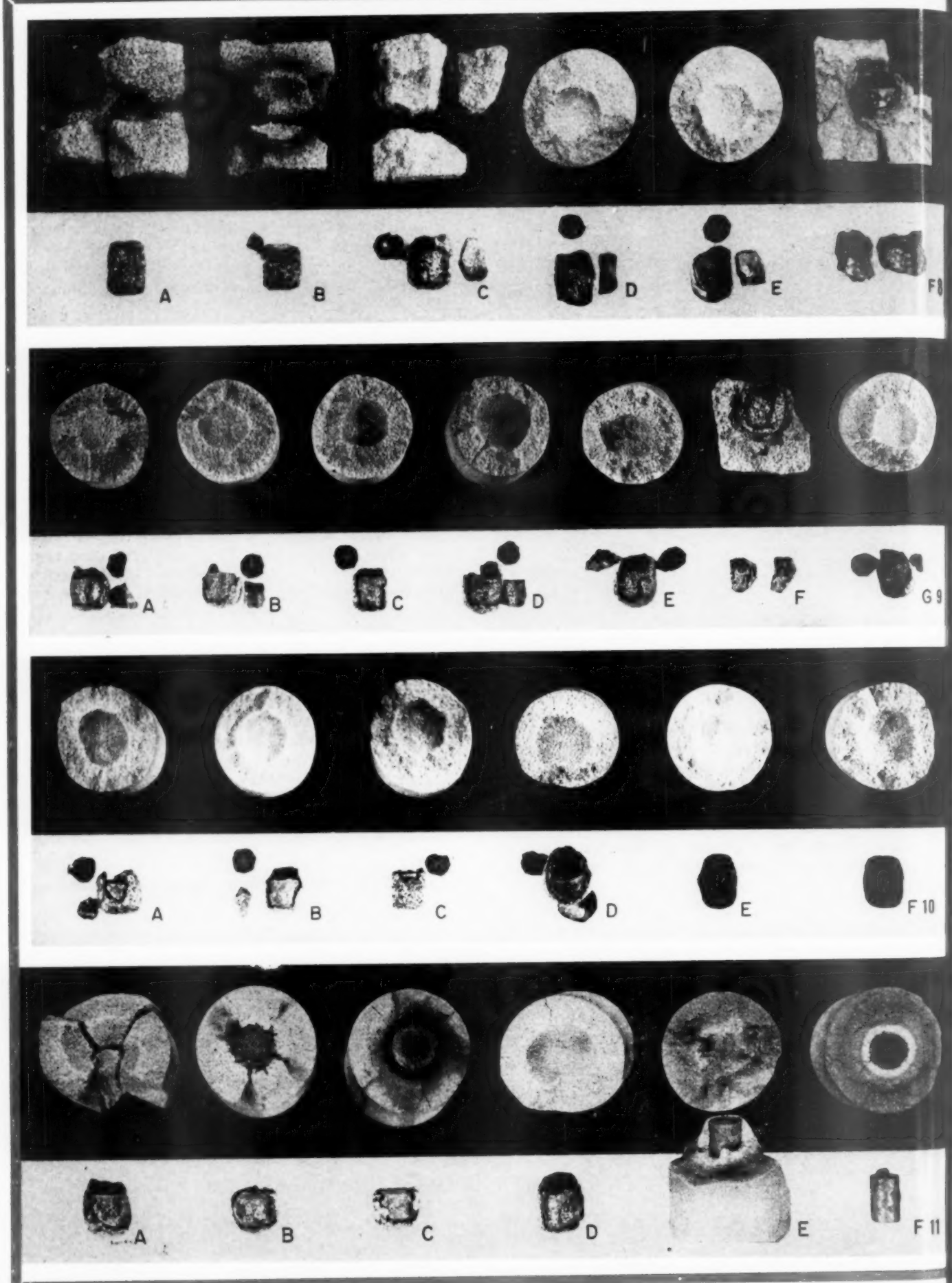
The leveling of the time-temperature curves indicates that melting begins at 1.8 minutes. Since the heat of fusion of iron is approximately 25 per cent of the heat required to raise the temperature of iron to its melting point, melting would be complete at 2.3 minutes if the heat lost by the pin remains constant. Fig. 6 shows the pin definitely melted at 2.5 minutes; additional time adds superheat to the metal. For example, at 3½ minutes the temperature of the metal was 1750°C. The rates of heating were similar for the various tests made.

Correlation with Foundry Practice—Samples of sintered sand, Fig. 7, peeled from steel castings made at the Hunt-Spiller Mfg. Co., Boston, were compared with samples from the pin test. X-ray diffraction measurements were made on several specimens; this is the most critical quantitative test available. The x-ray patterns showed fayalite, an iron silicate compound ($2\,FeO \cdot SiO_2$), to be the reaction product in both cases, and the patterns were essentially identical. The transformation products of silica sand were superimposed on the fayalite pattern in all cases, since an exact separation of reacted from unreacted sand grains was neither necessary nor possible. The excellent correlation of plant and laboratory specimens proved the test suitable for studying mold-metal interface behavior.

Variation in Heating Time—Fig. 6 shows the effect of increased heating time on casting surface. A black, progressively thicker, interface layer was formed as the time of heating increased; this layer was very adherent and could not be peeled from the pin except at long heating times. The black interface material became light gray when pulverized, indicating that the reaction was confined to the surface layer of the sand grains. The metal surface was rough where the

Fig. 7—Sintered sand from commercial steel castings




A
B
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F 10
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E
F 11

Fig. 8—Effect of Sand Grain Size Variations

Specimen Number	Grain Size, U.S. Screen	Sand Additions—Bentonite	Sand Additions—Water
2A	+30 —20	3.0%	3.0%
2B	+40 —30	3.0	3.0
2C	+50 —40	3.0	3.0
2D	+70 —50	3.0	4.5
2E	+100 —70	3.0	3.0
2F	—170 to pan	5.0	15.0

High-frequency amperes, 104-5. Heating time, 3½ minutes. Number of rams, three. Atmosphere, air. Type of pin, 1040 steel. Sand type, silica round grain. Mold, dry sand.

Fig. 9—Effect of a Varying Bentonite Content

Specimen Number	Pin Type	Bentonite, %	Pin Loss in Weight, %
3A	1040 steel	2.0	0.9
3B	1040 steel	3.0	1.0
3C	1040 steel	4.0	1.1
3D	1040 steel	5.0	1.1
3E	1040 steel	10.0	1.1
3F	1040 steel	20.0	1.5
3G	1040 steel	3.0	1.2

High-frequency amperes, 103-5. Heating time, 3½ minutes. Number of rams, three. Atmosphere, air. Sand type, New Jersey silica round grains 4-24 for 3A through 3F, silica round grains for 3G. Sand grain size, U. S. Screen No. +70 —50. Mold, dry sand. Water addition, 4.0 per cent.

Fig. 10—Variations in Pin, Sand and Mold Types

Specimen Number	Pin Type	Grain Size U.S. Screen	Mold Type	Pin Loss in Weight, %
4A	Armco Iron	+70 —50	Dry	2.1
4B	1040 steel	+70 —50	Dry	1.1
4C	1040 steel	Commercial	Dry	..
4D	1040 steel	Commercial	Dry	1.6
4E	1040 steel	+70 —50	Green	..
4F	1040 steel	Commercial	Green	..

High-frequency amperes, 103-4. Heating time, 7 minutes for 4D, 3½ for all others. Number of rams, three. Atmosphere, air. Sand type, New Jersey silica, round grains 4-24. Sand additions, 3 per cent bentonite, 4 per cent water.

Fig. 11—Variations in Mold and Sand Types

Specimen Number	Sand Type	Grain Size U.S. Screen	Pin Loss in Weight, %
5A	N.J. silica, round grains 4-24	—40 to pan	0.9
5B*	N.J. silica, round grains 4-24	+50 —40	0.9
5C*	N.J. silica, round grains 4-24	+50 —40	1.0
5D	N.J. silica, angular grains 30-2	+70 —50	1.0
5E	Zirconium silicate	Commercial	+0.4
5F	Zirconium silicate	Commercial	1.2

*Two-piece mold used. High-frequency amperes, 103-5. Heating time, 3½ minutes. Number of rams, fifty for 5C, three for all others. Atmosphere, air. Pin type, 1040 steel. Mold type, green sand for 5F, dry sand for all others. Sand additions, 4 per cent water, 3 per cent bentonite.

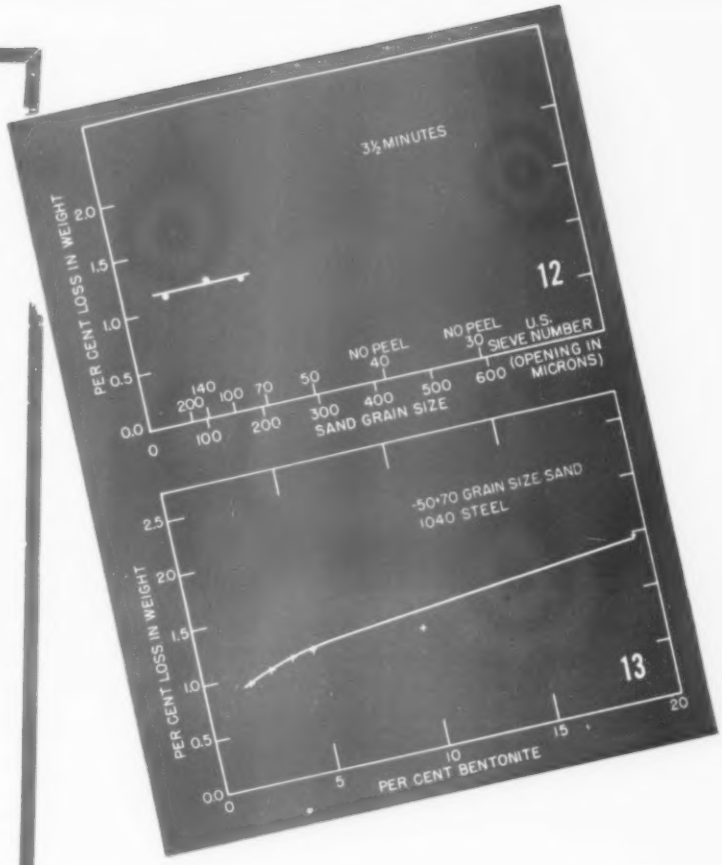

Fig. 12—Weight loss (per cent) vs sand grain size

Fig. 13—Ratio of weight loss to bentonite content

sand was scraped from the pin. The sand showed a series of color changes which were dependent upon the temperature attained at various distances from the pin into the sand.

Variation in Grain Size of Sand—The effect of variation in sand grain size on the per cent loss of weight is shown in Fig. 12. The sand peeled more easily as the grain size decreased. Fig. 8 shows a progressive decrease in pin height and increase in diameter for the finer sands. A possible explanation is that the metal was heated enough to melt the silica sand and the smaller grains were easier to melt. A layer of vitreous silica surrounded the pin and filled the void spaces between the sand grains. Since the melted layer formed earlier in the fine-grained sand, the weight of the molten metal could force this layer outward and the pin would become shorter and larger in diameter. X-ray diffraction patterns of the mold-metal interface showed that the silica sand was mostly vitreous, which also indicated that the silica had melted. Nodules appeared on the surface of the metal pins. The nodule size increased, while the number of nodules decreased with decreasing sand grain size.

Variation of Bentonite Content—Bentonite is used in molding sands in amounts from 3 to 6 per cent for binding. Fig. 9 shows how an increase in bentonite affected the surface appearance of the pins. The pin with 20 per cent bentonite had an extremely rough and uneven surface. The nodules were very pronounced. Upon sectioning, there was a large

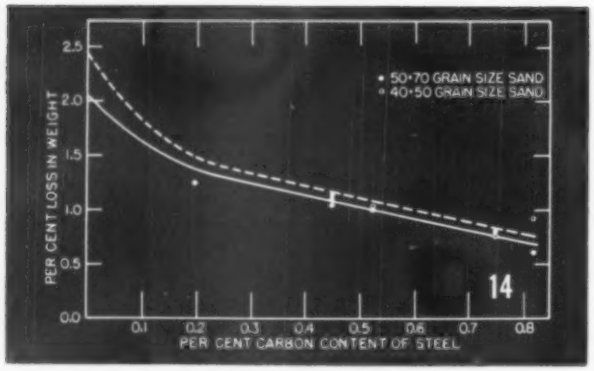

Fig. 14—Weight loss vs carbon content of steel

shrink hole in the interior of the pin. Channels led to the outside surface from the central shrink hole; these appeared to be due to excessive gas absorbed by the metal. Large amounts of bentonite gave a roughened surface.

The curve of Fig. 13 shows that the per cent loss in weight increases directly with bentonite content; the per cent loss ranges from 0.9 to 1.5 with variations in bentonite from 2 to 20 per cent. The higher amounts of bentonite were of no practical significance and are only included to indicate interesting sidelights.

Variations in Pin, Sand, and Mold Type—Fig. 10 shows a comparison of pin, sand and mold types. The Armco iron pin lost 2.1 per cent weight, while the steel pin lost 1.1 per cent. The interface layer did not peel when a commercial grade of silica sand was used. However, when sand of +70 −50 grain was used, the interface product peeled from the pin. When the coarser sand grains were screened out, leaving sand of 40 mesh and finer, the sand peeled readily from the pin. The ability to peel was related closely to the sand grain size. When the commercial sand which did not peel originally was heated longer, the sand peeled with a loss in weight of 1.6 per cent. The fused interface layer was thicker, which would indicate actual melting of the sand grains with the subsequent ferrostatic pressure forcing the fused layer outward.

The tests using green sand molds made of commercial and of +70 −50 mesh silica sand indicated that water was an important factor in surface finish. The sand did not peel completely from either specimen, although the +70 −50 sand gave a smoother pin surface. Both pin surfaces were scabby, with no definite boundary between the pin and surface material such as found when dry sand molds were used.

Variation in Mold Hardness, Pattern Shape, Sand Type and Size—The comparison of those variables is shown in Fig. 11. It appeared that mold hardness had only a minor effect on the amount of mold-metal interface product formed. When the number of rams was increased from 3 to 50, the per cent loss of weight increased from 0.9 to 1.0 per cent. The hardness of the rammed sand, as measured by a Dietert mold hardness tester, changed from 51 to 84 as a result of this difference in ramming.

When a two-piece mold was tested and the cavity for the metal enlarged, there was somewhat less mold-metal interface product formed. This may be related, in part, to the smaller contact area between the pin and the sand, since the pin fitted loosely in the mold. Rounded and angular sands were used to indicate the effect of sand type; no apparent difference was noted in the results. A commercial zirconium silicate sand was tested in the green and dry condition. The pins retained their original shapes, showing little tendency for an interface product to form. Sand adhered in

Fig. 15—Effect of Carbon in Pins, Sand Grain Size

Specimen Number	Pin Type	Grain Size U.S. Screen	Pin Loss in Weight, %
6A	Armco Iron (0.0C)	+70 −50	2.1
6B	B-1 (0.195C)	+70 −50	1.2
6C	B-3 (0.525C)	+70 −50	1.0
6D	B-5 (0.75C)	+70 −50	0.8
6E	B-6 (0.82C)	+70 −50	0.7
6F	1040 steel (0.45C)	+70 −50	..
6G	Armco Iron (0.0C)	+50 −40	2.5
6H	B-1 (0.195C)	+50 −40	..
6I	B-3 (0.525C)	+50 −40	1.0
6J	B-5 (0.75C)	+50 −40	0.8
6K	B-6 (0.82C)	+50 −40	0.9
6L	1040 steel (0.45C)	+50 −40	..

High-frequency amperes, 103-5. Heating time, 2 11/12 minutes for 6H, 3½ minutes for all others. Atmosphere, air. Sand type, New Jersey silica, round grains 4-24. Mold type, dry sand. Sand additions, 3 per cent bentonite, 4 per cent water.

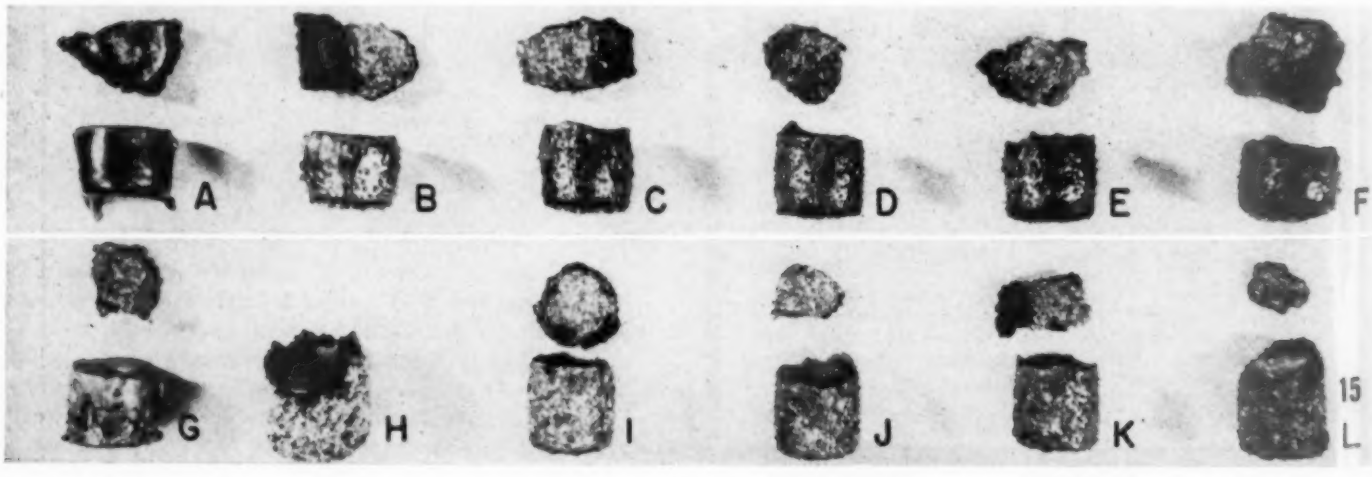

TABLE I—Chemical Analysis of Test Steels

Pin	C	Mn	Si	S	P
Armco	...	..	..	...	...
B-1	.195	.93	.26	.036	.012
1040 Steel	.45	..	..	...	...
B-3	.525	.87	.29	.028	.015
B-5	.75	.53	.19	.027	.010
B-6	.82	.80	.24	.026	.009

spots to both pins.

Variation in Carbon Content of Steel and Grain Size of Sand—The results of a series of tests with steel pins of increasing carbon content are shown in Fig. 15; the per cent loss of weight decreased as the carbon content increased. Photomicrographs before and after induction heating and chemical analyses of the entire carbon series are given in Fig. 16 and Table I. The pins were severely decarburized in all cases, except for the Armco iron, which was nearly carbon free initially. Preferential oxidation of the elements in the steel might explain the decreased loss in weight with increased carbon. All commercial steel castings have a decarburized layer on their surface, indicating preferential oxidation of the carbon. The formation of iron oxide would be retarded until the carbon had oxidized, and no fayalite could form until the carbon was removed from the surface layer. Fayalite can be seen on the Armco pins in Fig. 15 as a silvery, mirror-like coating. Fig. 14 relates per cent loss in weight with carbon content.

The per cent loss in weight was greater for coarse sand than for fine. This was probably because it was easier for oxygen to reach the pin surface through the coarser sand. The iron was oxidized more readily and more interface product could form.

Summary:

1. A test is described in which a steel pin is embedded in a standard sand test specimen and melted "in situ" by induction.

2. The interface reaction and the products formed reproduce those occurring in sand molds when molten steel is poured into them.

3. Reaction products were checked by x-ray diffraction, Fayalite ($2FeO \cdot SiO_2$) was the only reaction product found in foundry and in laboratory samples. The x-ray patterns from both types of samples were identical.

4. The probable reaction is:

Fe (from the steel) + O (from the mold) $\rightarrow$FeO

$2FeO + SiO_2$ (sand) $\rightarrow 2FeO \cdot SiO_2$ (Fayalite)

and the reaction is time and temperature dependent.

5. The "sinter-pin" test has many uses; some of the uses are mentioned and the results of a few tests show the utility of the method.

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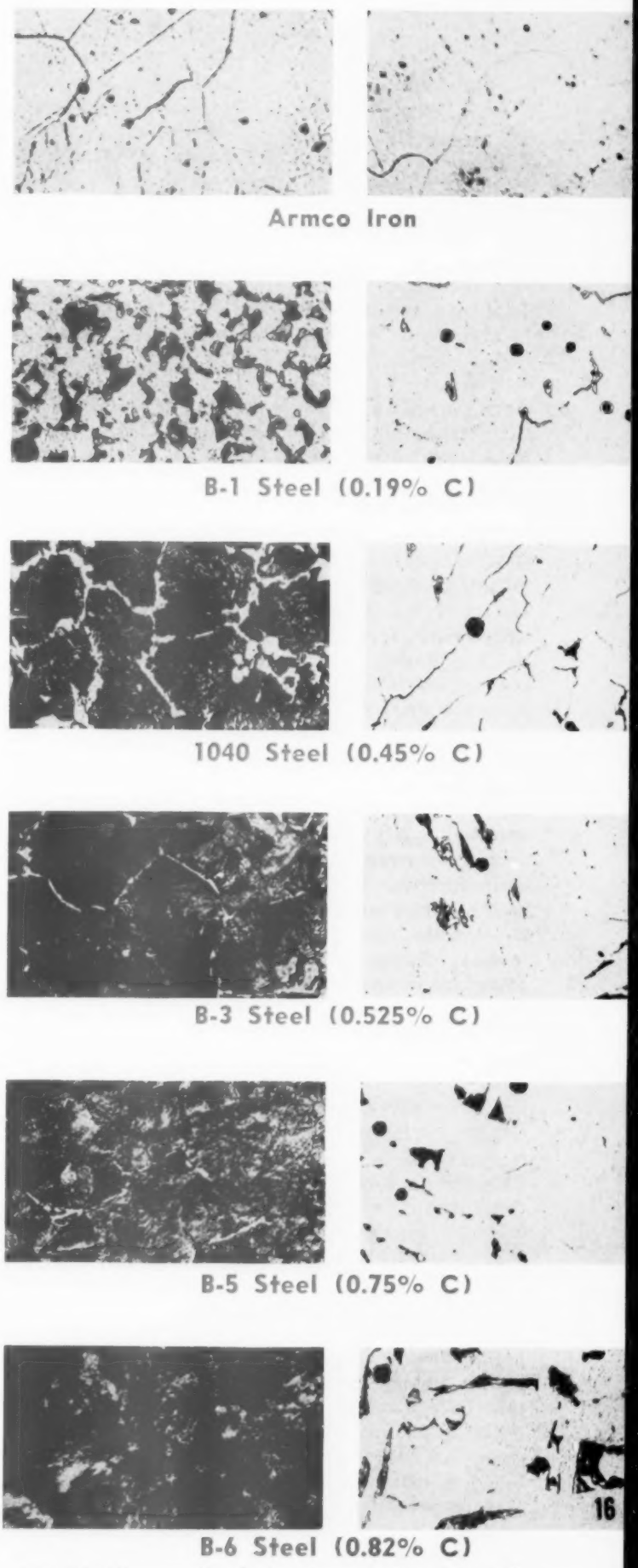


Fig. 16—Micrographs of pins shown in Fig. 15. Left, before inductive heating; right, after heating. (200X)

AUTOMOTIVE CASTI

This is one of four papers presented at a symposium on cast iron conducted at the first Pacific Area National Meeting of the American Society for Testing Materials. The author, at the time of his death, June 21, was iron foundry division manager, Vanadium Corp. of America, Detroit

WHILE it is true that such specification-making bodies as ASTM and SAE have attempted to describe automotive irons, it is not always true that the manufacturer adheres strictly to those specifications. It should be mentioned that the committees of these two societies work in close harmony, and their specifications are in general in complete agreement. The trend in all specifications is toward the acceptance of physical standards, and chemical composition is secondary. The tables which accompany the SAE specification are indicated as suggestions only and are not mandatory.

The suggested chemical composition presupposes some form of ladle addition which is known as inoculation. An explanation of how inoculation affects the specifiction is in order. The use of an inoculant is usually accompanied by an increase in tensile strength and deflection. However, another effect of the inoculant is the usual cause of its adoption in automotive practice. It has been found possible to make an iron approximately 0.20 per cent higher in carbon and obtain by inoculation as good physical properties as was called for in the original specification. This higher carbon level is appreciated by the foundrymen because of its tendency to lower shrinkage and to improve general foundry characteristics.

The above explanation has been given to account for the gradually developing tendency toward higher carbon irons in most automotive specifications. The SAE listing might be considered as indicating the trend in this direction. SAE No. 120 suggests a carbon of 3.20 to 3.40 and a silicon of 1.90 to 2.20. The suggested analysis calls for manganese from 0.60 to 0.90. In view of the fact sulphur is mentioned as being 0.12, it would appear that the manganese specification is on the high side. In the event that manganese should be placed on the list of strategic materials, this specification may assume a very important place in our discussions.

The other element mentioned, phosphorus, is suggested at 0.15. Some will question the necessity for this low maximum. It is quite generally conceded that phosphorus in automotive irons is very closely related to shrinkage and the 0.15 shown in the specification represents the thinking of those who have had difficulties, which had been cured by consistently controlling this element. There are those who will insist that a limit of 0.20 or even 0.25 gives a safe working margin.

Referring again to the matter of higher total carbons, it should be emphasized that shrinkage is inversely related to total carbon content and that many cases of trouble reported as "open iron" may be actually a condition of micro-shrinkage or micro-porosity. This is particularly noticeable in castings of intricate design, especially when the iron is relatively low in total carbon and high in phosphorus.

Even if it were not possible to attain as high tensile values with the higher total carbon, there is still a justification for the higher carbon practice from a standpoint of better correlationship of casting and test bar properties.

Few engineers would quibble over the acceptance of a 35,000-pound iron of known and proven soundness as being preferable to a 40,000-pound iron of higher shrinkage and consequently greater tendency to exhibit open areas at junction of light and heavy sections. The experience of several large companies who have moved in this direction, fortifies this positon.

No mention will be made of the effect of alloys, since it is the function of the alloy companies to exploit their own products, and information is available as to the effect of each of the commonly used elements which are classified as gray iron alloys.

Turning now to the physical property specifications, it should be noted that SAE No. 120, which is a cylinder block iron specifies a brinell hardness of 187 to 241. In the footnote of the accompanying table you will note that this is taken on a bar of 1.2 inches in diameter, and that stress relieving at 1050 is permissible. The transverse load is given as 2400 pounds and the deflection is 0.24 inches. The tensile load is 35,000 psi. Quite frequently manufacturers have had difficulty in meeting both the transverse and tensile specifications. It might be assumed from the table that a certain factor exists which would indicate one from the other, but it has been found that the method of melting and foundry molding practice may change this factor as much as 20 per cent.

Because it is not practical to obtain a chemical analysis at intervals of less than one hour in conventional shops and half an hour in shops equipped with spectroscopic analysis procedure, some method has had to be devised to serve as a routine check on each

IRONS

By RICHARD G. McELWEE

ladle. The chill test which is being developed as a standard by the AFS is very generally used. It is conducted by pouring a sample of iron in a dry sand mold of such size as to cause the iron to show a white fracture over a part of the test casting. The depth or width of this white part of the fracture is recorded as indicating the suitability of the iron for the part in question. The establishment of chill depth or width is a purely arbitrary standard which must be set up by each manufacturer depending upon his views on the permissible deviation from ideal structures and his desire to obtain maximum machinability.

At least one manufacturer of diesel engine equipment has adopted what is, in effect, a metallographic specification. It is quite generally agreed that this is the ideal situation. Unquestionably it would be adopted widely except for the difficulty of finding sources properly equipped to accept a metallographic description as a standard. This specification says, in effect, that the permissible deviation from pearlite or martensite shall contain not more than 5 per cent of constituents, such as ferrite or carbide. This arrangement is in effect with one or more of the machine tool builders and seems to operate very well. It is quite probable that more microscopic specifications will be adopted as conditions permit.

Most automotive shops make, in addition to the cylinder iron described, what they refer to as a soft iron. This would be approximately equal to SAE No. 110. The brinell hardness is established at 187 maximum and the strength at 20,000. This is used for all of those parts which are not subject to wear or excessive loads. A major development is in progress on this type of material. Costs of machining have been studied carefully, and the ability of carbide tools to stand up under terrific loads has made it possible to use speeds and feeds much greater than we have ever known before in machine shop practice. An attempt is being made to obtain hardness low enough to permit these previously unheard-of speeds and feeds. Two methods are being used. In one case the castings are completely annealed. In the other case additions are made to the ladle which have the effect of softening the castings to meet these unusual requirements. The choice of the method is based on economic conditions.

In the matter of brake drums a completely different approach has been used. A large amount of research work has established the fact that a brake drum material should have a minimum total carbon of 3.40. If fact, this value was itself a compromise, the general feeling being that 3.60 would have been better. Naturally, the silicon must be adjusted downward to obtain the desired hardness and strength. Two unusual things occur as a result of this practice. One of them is that our accepted standards of hardness must be revised. The larger amount of graphite makes the indentation of the ball much larger than the matrix would seem to justify. The other effect is that as the graphite content increases, the modulus of elasticity becomes (*Please turn to page* 214)

Automotive Type Cast Iron

SAE No.	Hardness, Bhn	Transverse, Lb Min	Deflection, In. Min	Tension, Psi Min
110	187 Max.	1800	.15	20,000
111	170-223	2200	.20	30,000
120	187-241	2400	.24	35,000
121	202-255	2600	.27	40,000
122	217-269	2800	.30	45,000

Properties determined from arbitration test bar (1.2 in. diameter or cast or stress relieved at 1050 deg. F max.) These properties identical with those of ASTM specification No. A 159-49T.

SUGGESTED USAGE

SAE 110—Miscellaneous soft iron castings (as cast or annealed) in which strength is not of primary consideration. Exhaust manifolds may be made of this grade of iron alloyed or unalloyed.

SAE 111—Small cylinder blocks, cylinder heads, air-cooled cylinders, pistons, clutch plates, oil pump bodies, transmission cases, gear boxes, clutch housings, light-weight brake drums, etc.

SAE 120—Automobile cylinder blocks, cylinder heads, fly wheels, truck brake drums, cylinder sleeves, cylinder liners, pistons, etc.

SAE 121—Truck and tractor cylinder blocks and heads, heavy flywheels, tractor transmission cases, differential carrier castings, heavy gear boxes.

SAE 122—Diesel engine castings, liners, cylinders, pistons and heavy parts in general.

The analyses shown are not to be construed as required or sufficient. In some cases it may be desirable to use alloying elements to obtain the specific service requirements demanded. The kind and amount of the alloying constituents used should be a matter of agreement between the supplier and the purchaser.

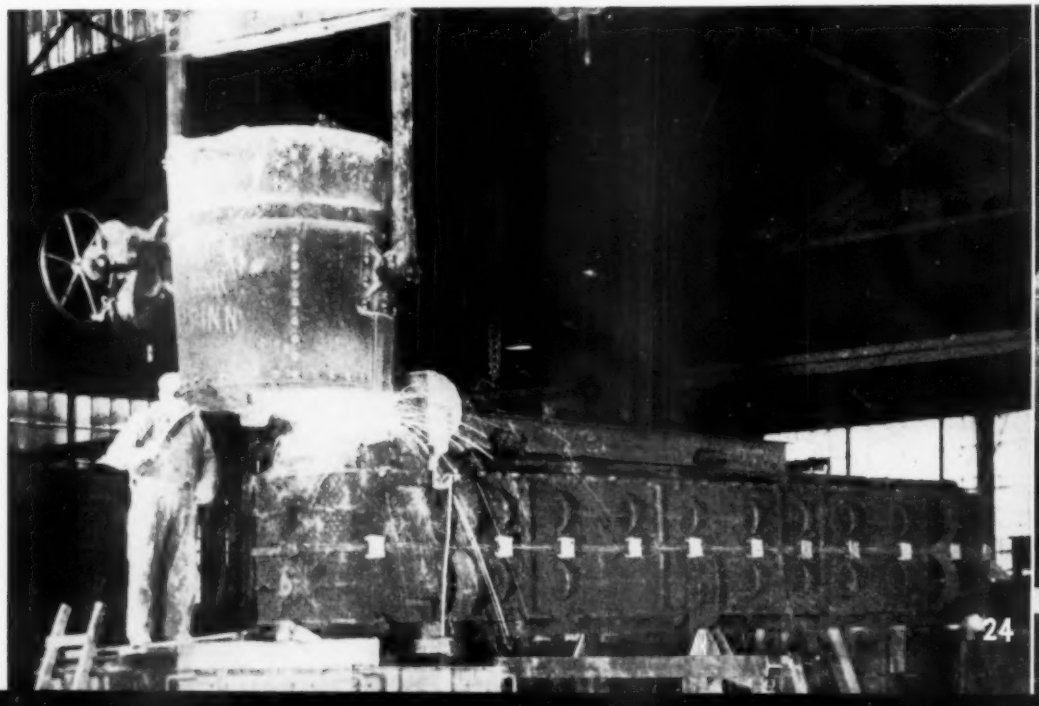
Gray Iron for Brake Drums and Clutch Plates

	SAE 113	SAE 114
Chemical Composition		
Carbon, total	3.40 Min	3.40 Min. (mandatory)
Silicon	1.10-1.70	1.10-1.70 (as desired)
Manganese	0.60-0.90	0.60-0.90 (as desired)
Sulphur	0.14	0.14 (typical)
Phosphorus	0.20	0.20 (typical)
Alloys	As required	As required
Physical Properties		
Hardness, bhn	179-229	207-269
Traverse, lb min.	2200	2600
Deflection, in., min.	0.20	0.27
Tensile, psi, min.	30,000	40,000
Structural Properties		
Graphite	Type A, Size 2-4	Type A, Size 3-5
Matrix	Lamellar pearlite with ferrite, if present, not to exceed 15 per cent approx.	Fine lamellar pearlite with excess constituent, free cementite or free ferrite or both not to exceed 5 per cent approx.

SAE 113—Brake drums and clutch plates for moderate service requirements where high carbon iron is desired and heat checking is a problem.

SAE 114—Heavy duty drums and clutch plates where both heat checking and strength are definite requirements. Since the same base iron is indicated for both SAE 113 and SAE 114 it is presumed that alloys will be used especially in the latter to meet the strength and structural requirements.

Fig. 23—Adding inoculation alloy to melt of cast iron for crankshafts



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DIESEL ENGINE Crankshafts

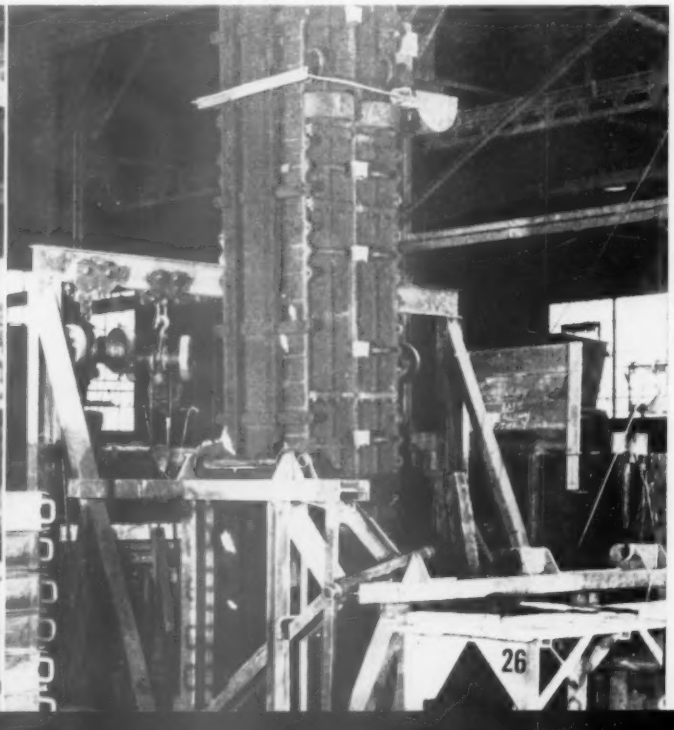
Cast in Gray Iron

This is the second of two articles describing the production of large gray iron crankshafts by the Pacific Car & Foundry Co. Operations discussed here include pouring, cleaning, heat treating and final inspection

THE furnace is emptied with as much speed as possible to preclude physico-chemical changes in the bath which might upset the proper interaction of the inoculant and so affect final properties of the metal. The spout is tilted fully forward to bring the liquid level well above the tap hole and so retain until near the end any residual slag which would otherwise flow out on the stream and interfere mechanically with the Nisiloy. This material is the inoculating alloy which is shoveled in below the stream in five successive scoops of some 25 lb each (Fig. 23). The addition begins when the ladle is about one-quarter full and is completed during the pouring of the middle third of the melt, or in a period of about ten seconds. Nisiloy is usually employed in the ratio of 30 lb for each ton of metal charged but in our practice is mixed with 10 per cent of its weight of finely crushed standard ferrosilicon.

With all due respect to the "carbon nuclei," "gas content" and "silica slime" theories of inoculation, our experience indicates that it is a phenomenon associated primarily with high oxidation followed by complete and sudden reduction—an effect which may be due simply to a change in the diffusion rate of carbon following the removal of excess oxygen. In any event, the added silicon balances the slight loss

Fig. 24—Pouring cast iron crankshafts with bottom pour ladle. Mold is mounted on trunnions
Fig. 25—Rotating 21-ft poured mold to the vertical position for gravity feeding and cooling
Fig. 26—Poured mold stands vertically in pit



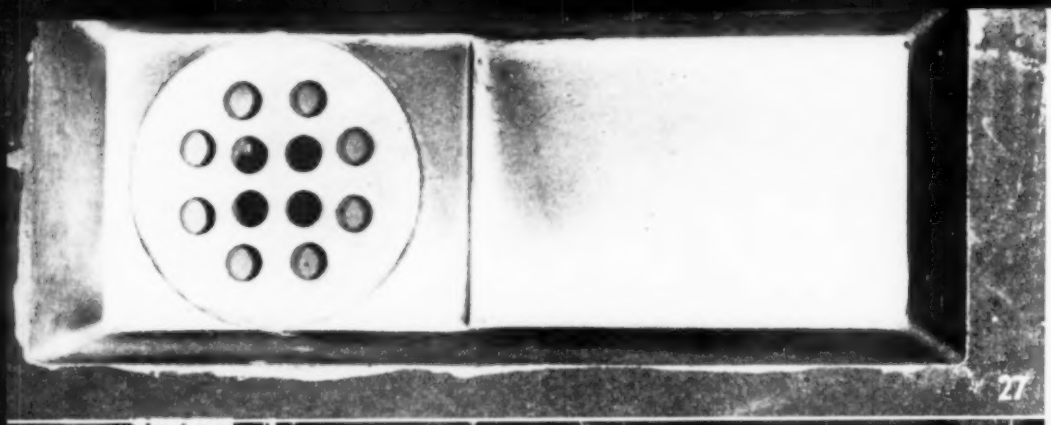


Fig. 27—Inside of runner box showing depressed pouring basin and flood level with strainer core

Fig. 28 — Crankshafts are shaken out at 500°F or less. Here the runner box still is in place with trough of metal spilled when mold was elevated

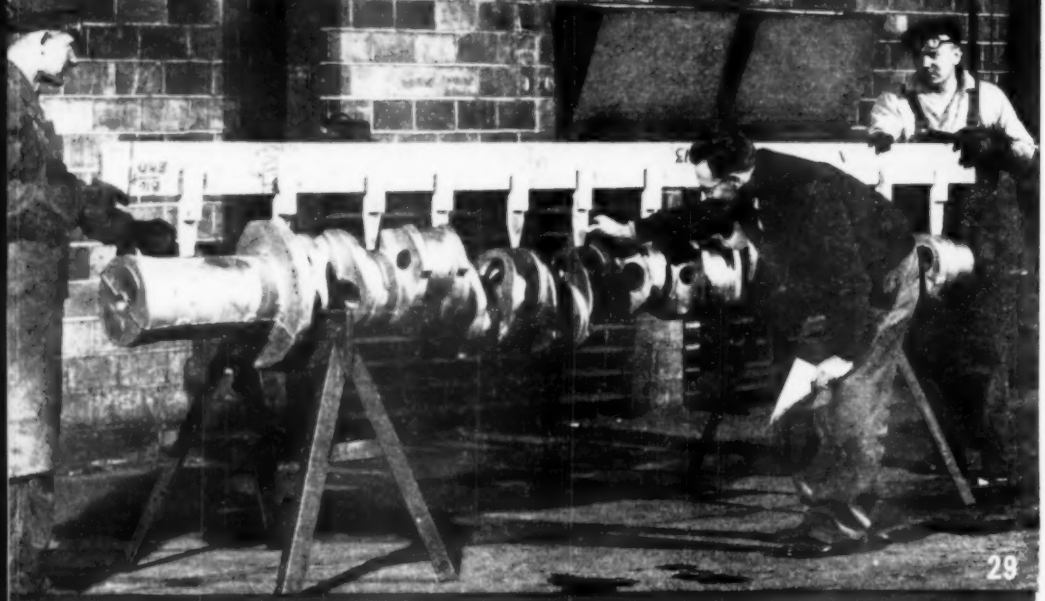


Fig. 29 — Final inspection checks cranks for visible defects and straightness

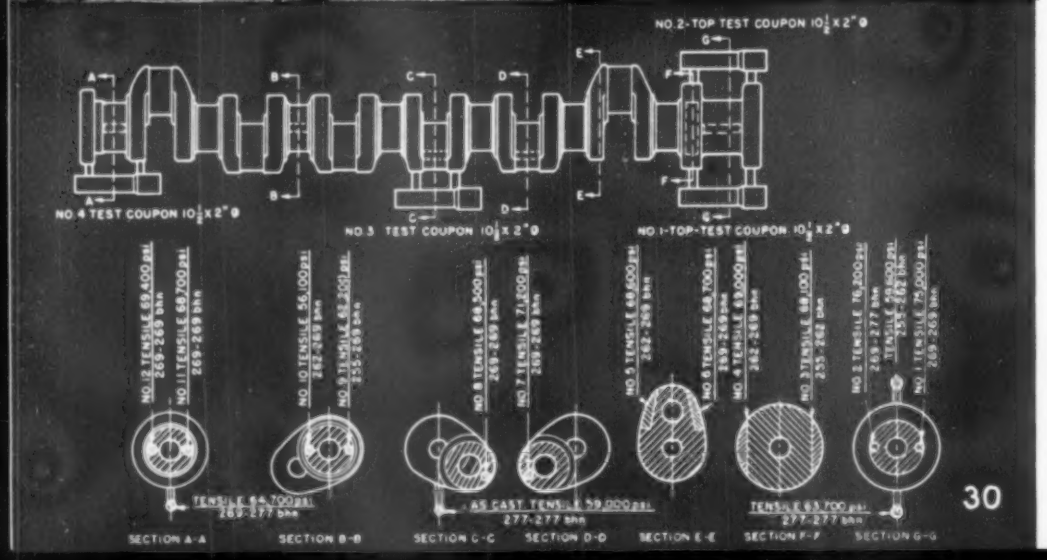
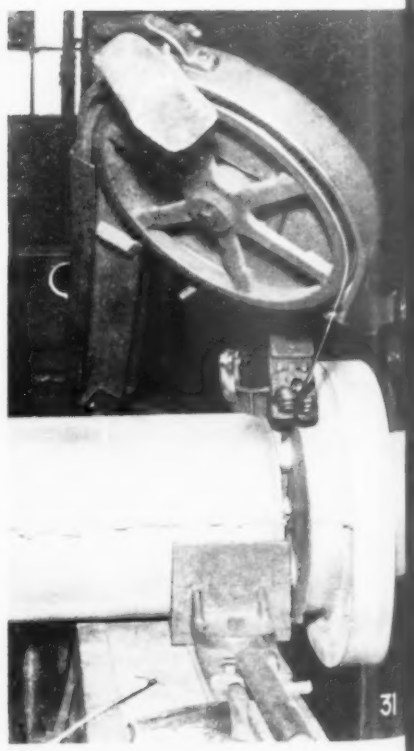

NO. 2-TOP TEST COUPON 10½ X 2" Ø
NO. 4 TEST COUPON 10½ X 2" Ø
NO. 3 TEST COUPON 10½ X 2" Ø
NO. 1-TOP-TEST COUPON 10½ X 2" Ø
NO. 12 TENSILE 69,400 psi 269-269 bhn
NO. 11 TENSILE 68,700 psi 269-269 bhn
NO. 10 TENSILE 56,100 psi 262-269 bhn
NO. 9 TENSILE 63,300 psi 255-269 bhn
NO. 8 TENSILE 68,500 psi 269-269 bhn
NO. 7 TENSILE 71,200 psi 269-269 bhn
NO. 5 TENSILE 68,600 psi 262-269 bhn
NO. 6 TENSILE 68,700 psi 269-269 bhn
NO. 4 TENSILE 69,000 psi 262-269 bhn
NO. 3 TENSILE 68,100 psi 255-262 bhn
NO. 2 TENSILE 76,200 psi 269-277 bhn
NO. 1 TENSILE 79,000 psi 269-269 bhn
TENSILE 64,700 psi 269-277 bhn
AS CAST TENSILE 59,000 psi 277-277 bhn
TENSILE 63,700 psi 277-277 bhn
SECTION A-A
SECTION B-B
SECTION C-C
SECTION D-D
SECTION E-E
SECTION F-F
SECTION G-G

Fig. 30—Sketch of 1000-lb, six-throw crankshaft with 5½-in. hollow journals. Tensile and hardness properties at various locations are shown. See Figs. 33-38 for micrographs of specimens which were taken from these locations



of this element that sometimes follows the intense oxidation at high temperature in the final stages and certainly aids in graphitization.

The ladle, although previously fired to a bright red heat, may be relatively cold (below 500° F) when it receives the molten iron. This is often desirable and is purposely arranged to shorten the time of cooling not only from the fluid to the solid state and so retain the maximum effect from the inoculant, but from there to below the temperatures of secondary solid transformations. This latter is important, for protracted cooling due to excess heat storage in the sand will result in massive graphite (which some say is detrimental), and a coarse, "open" structure which does, in fact, impair the tensile properties.

Tapping the furnace takes from 35 to 40 seconds. When finished the metal in the ladle will be more or less covered with a thin coating of slag accumulated partly from the ladle lining and partly from the furnace residue. This slag is generally too thin and fluid to function as a surface insulation but since it cannot endanger the casting because of bottom pouring, it is not removed.

The graphitizing effect of the nickel-silicon inoculant, as manifested by the fracture of a chill test sample dipped from the ladle one minute after tapping, is shown in Fig. 32c. Usually, however, this test is omitted as unnecessary, the ladle being removed at once to the pouring stage and spotted over the first mold within two minutes from the time it was filled with hot metal from the furnace.

Table III shows how the desired final composition is developed under constant oxidation by suitable adjustment of the charge and close subsequent supervision of the melting operation.

For pouring, the molds are swung on trunnions over a pit, sloping upwards from the riser end at an angle of 7 to 10 degrees to protect the cope from radiant heat. Metal flows into the mold by gravity from a runner box made of ordinary core sand and with the bottom on the inside constructed on two levels as may be seen in Fig. 27. The lower portion, depressed about 2 in., provides a pouring basin from which the molten iron floods gently over the upper level where it is prevented from entering the gate immediately by a thin disk of tin laid over the strainer core. The box is nearly full before the tin melts and is so maintained throughout the pouring. Eroded sand or fused refractories from the ladle lining thus float on top and are not washed into the gate.

One to three cranks, depending on the total weight, may be poured from a single heat provided the entire contents of the ladle can be discharged within 12 minutes. Temperature of the iron entering the first mold averages 2790° F and will not fall more than 75 degrees before the last one is filled. Time of pouring will vary from 30 seconds for a casting requiring 1000 lb of metal to 80 seconds for one requiring 4000 lb of metal.

With the molding procedure hitherto described,

Fig. 31—Single end riser is removed by sawing the two small gates connecting with the crankshaft

Fig. 32—Oxidation progress and inoculation effect revealed by fractured specimens. *A*—Mottled (incomplete oxidation). *B*—White (complete oxidation). C—Gray (chill depth controlled by inoculant)

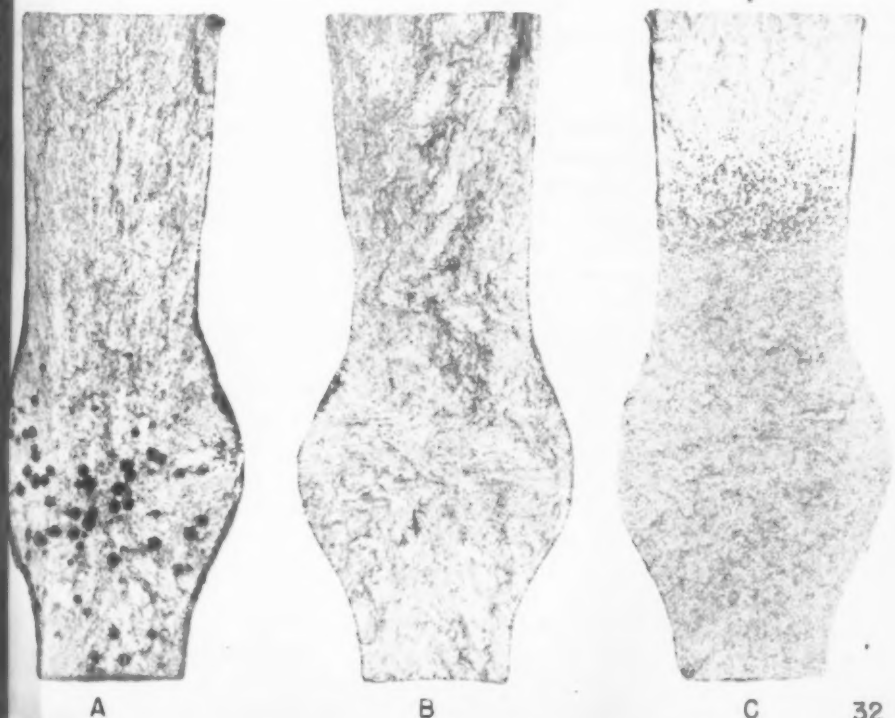


TABLE III—Chemical Changes and Adjustments in Melting a Typical 3½-Ton Heat

Physical Composition of the Charge	
Foundry returns, —35%	2520 lb
Pig iron, —35%	2520
Steel plate —30%	2160
80% Ferromanganese	78
50% Ferrosilicon	95
Nickel squares	29
Molybdic oxide (50% MoO_3)	94
Petroleum coke (98% C)	49
Total charge	7545 lb
Chemical Composition of the Charge*	
Total carbon	3.20%
Manganese	1.75
Silicon	1.80
Nickel	1.10
Molybdenum	1.00
Average Composition of the Bath at Time of Sampling, (average of 11 heats)	
Total carbon	2.85%
Manganese	1.52
Silicon	1.80
Nickel	1.10
Molybdenum	1.09

Quantity and Composition of Inoculant Added to Ladle	**Nickel**	**Silicon**
108 lb Nisiloy	65 lb	32.5 lb
15 lb Ferrosilicon	..	7.5
Totals	65 lb	40.0 lb

Final Composition (Average of 11 Heats)	
Total carbon	2.61%
Manganese	1.46
Phosphorus	0.030
Sulphur	0.025
Silicon	2.10
Nickel	1.97
Molybdenum	1.01

* Calculated from known analysis of returns, pig iron, steel plate, ferroalloys, etc.

Fig. 33—Specimen No. 1 (Fig. 30). Top, unetched X100; bottom, etched X500. Tensile 75,000 psi. Bhn 269-269

Fig. 34—Specimen No. 4 (Fig. 30). Top, unetched X100; bottom, etched X500. Tensile 69,000 psi. Bhn 262-262

Fig. 35—Specimen No. 6 (Fig. 30). Top, unetched X100; bottom, etched X500. Tensile 68,700 psi. Bhn 269-269

using a single riser and gravity feeding, it is important to control the pouring rate within certain limits established by experiment. Excessive speed will circumvent the process of directional solidification (of which the method is designed to take advantage) by promoting molten temperature equilibrium throughout the crankshaft. On the other hand, too slow a rate will set up an unnecessarily steep heat gradient between the two ends which results in sharp variations in tensile properties. Immediately the mold is filled it is slowly rotated through 90 degrees to the vertical position for cooling where it is allowed to stand for 16 to 18 hours. Figs. 24, 25 and 26 illustrate the pouring sequences.

Cleaning, Heat Treating and Final Inspection—The lighter crankshafts, those below 1000 lb, are nearly cold at the time of shakeout, but none are taken from the molds above 500° F for fear of warpage (Fig. 28). In the subsequent cleaning operations ordinary methods and equipment are employed for chipping, grinding and blasting. Risers are removed by sawing through the two short columns of connecting metal after knocking out the graphite core mentioned previously (Fig. 31). Although this may be accomplished more quickly with the carbon arc, the resulting air hardened surfaces must be ground away before machining, but the practice is perhaps more efficient in the long run.

Inspection is simultaneous and continuous with the cleaning room procedure because it is futile to apply labor after the appearance of significant flaws in critical locations. A small sand spot or porous area may be passed over if it appears not to extend below the machine finished surface, or if it occurs in a wholly unstressed region. Otherwise, the casting must be discarded since, for the reasons given earlier, repair welding may not be practiced. The losses here, embracing the full range of size and weight, are 8 to 10 per cent although total ultimate rejections may exceed 15 per cent because of subsurface defects uncovered during machining.

In this connection, however, it should be observed

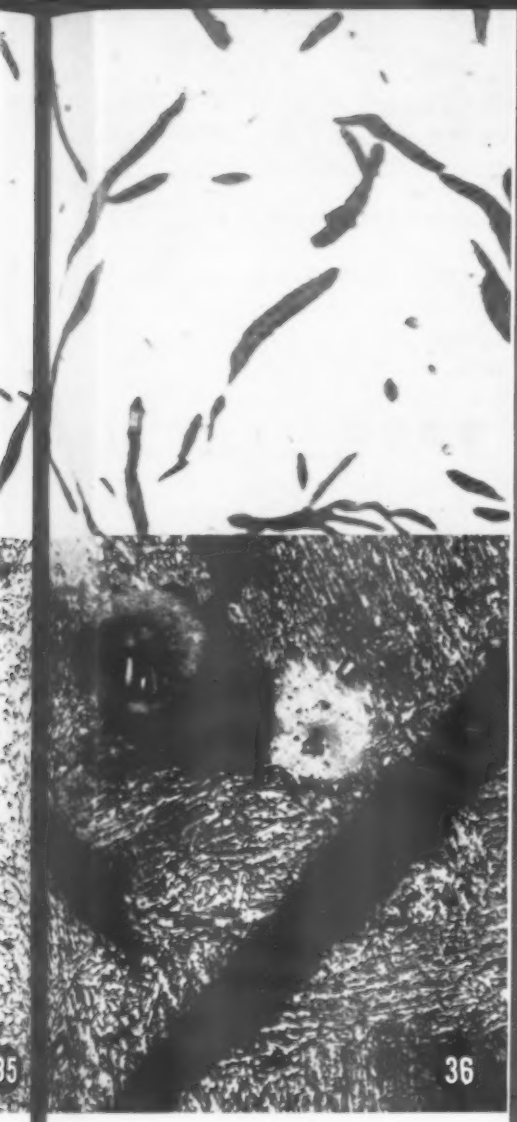


Fig. 36—Specimen No. 8 (Fig. 30). Top, unetched X100; bottom, etched X500. Tensile 68,500 psi. Bhn 269-269

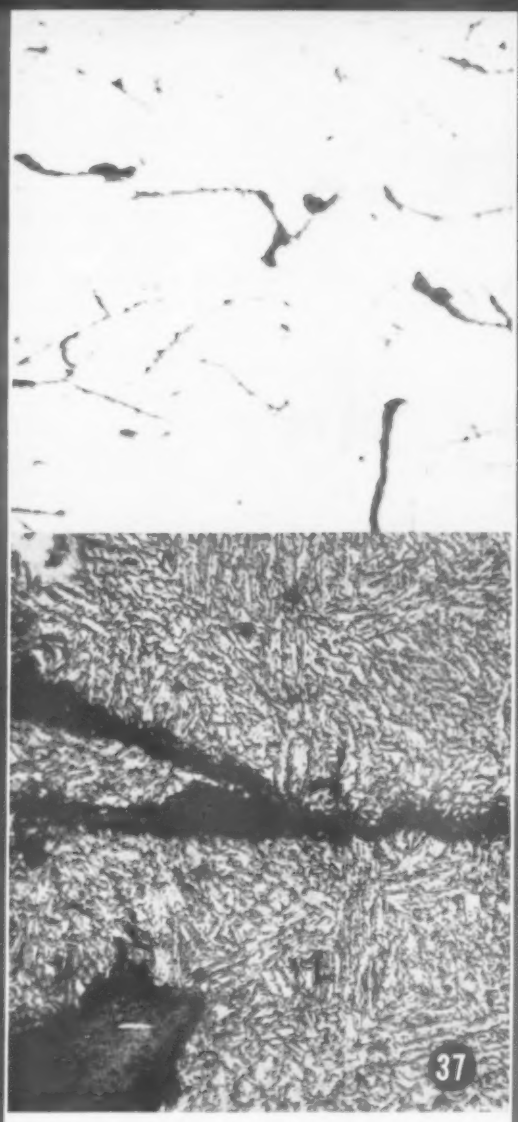


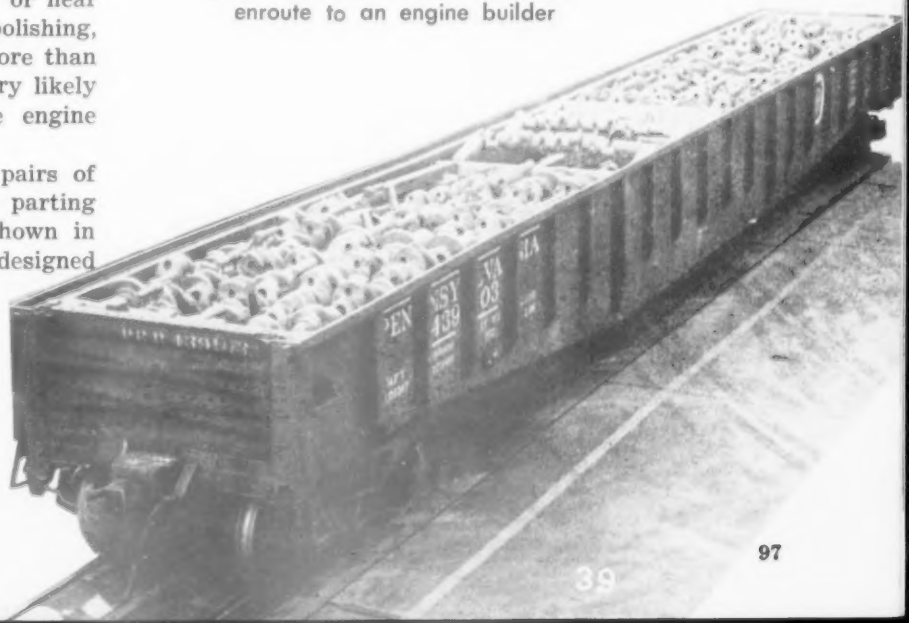
Fig. 37—Specimen No. 9 (Fig. 30). Top, unetched X100; bottom, etched X500. Tensile 62,200 psi. Bhn 255-262

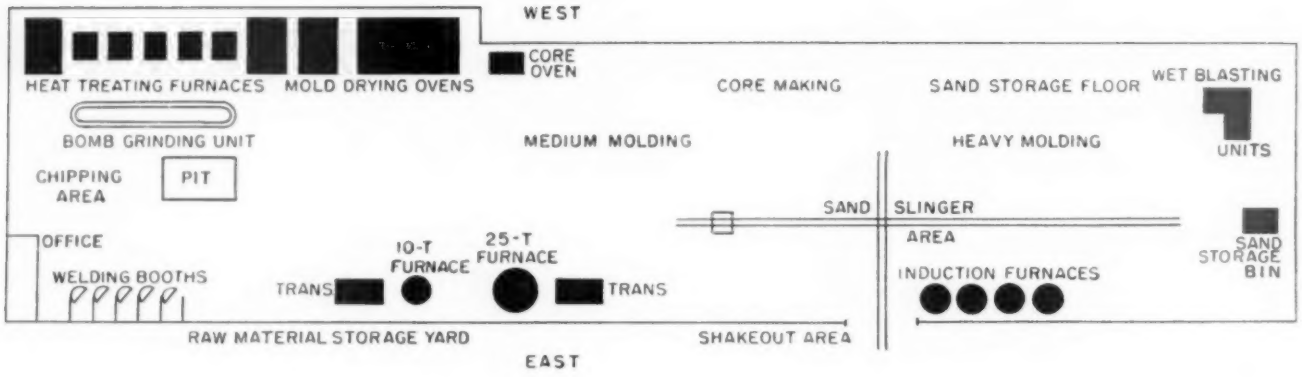
Fig. 38—Specimen No. 12 (Fig. 30). Top, unetched X100; bottom, etched X500. Tensile 69,400 psi. Bhn 269-269

that a finished crankshaft must be flawless from the engineering standpoint, and with that contingency these losses are not excessive. In certain instances, a small defect on a bearing surface, unless in or near a fillet, may be removed by grinding and polishing, but if the operation leaves a cavity much more than 3/32-in. deep or ¼ in. in diameter it will very likely be condemned, however needlessly, by the engine builders.

All crankshafts are provided with three pairs of test coupons attached to the casting on the parting line at the locations and in the manner shown in Fig. 2 (August issue). These coupons are designed in each case to have a section thickness representative of the critical dimensions of the crank and are so positioned as to have a comparable cooling rate. One bar from the middle pair (as indicated by its absence in the photograph), is (*Please turn to page* 216)

Fig. 39—Carload of 46 diesel engine crankshafts of various sizes enroute to an engine builder

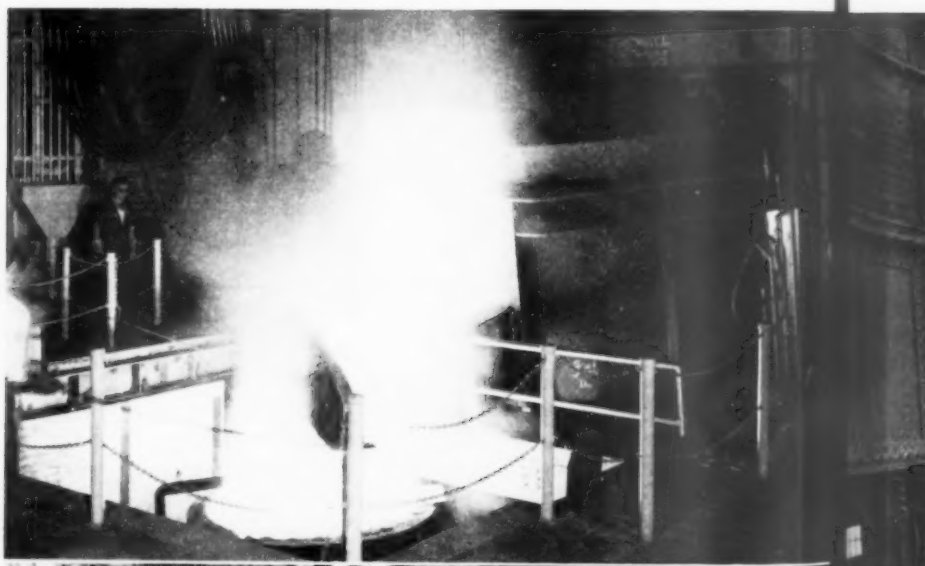




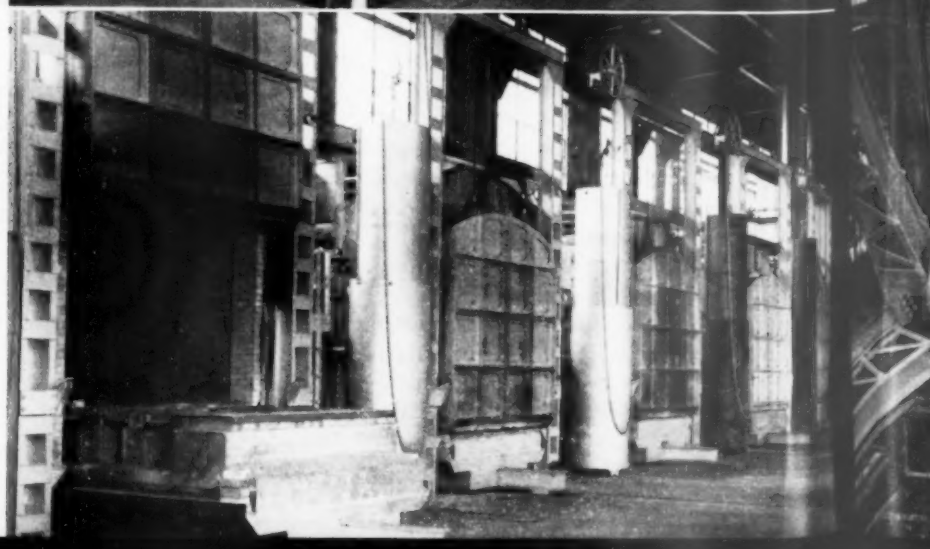
Sketch, not to scale, showing general arrangement of foundry departments

NAVY MODERNIZES F

By EDWIN BREMER
Metallurgical Editor
THE FOUNDRY



Tapping the 25-ton electric arc furnace



Heat treating and annealing furnaces

S FOUNDRY

STEEL foundry of the Naval Gun Factory, Washington, was designed primarily for production of medium weight and heavy castings which do not lend themselves well to mechanization, particularly when the number of castings from any pattern at one time is small. Hence modernization of this foundry is different from that used in the nonferrous foundry described in the May issue.

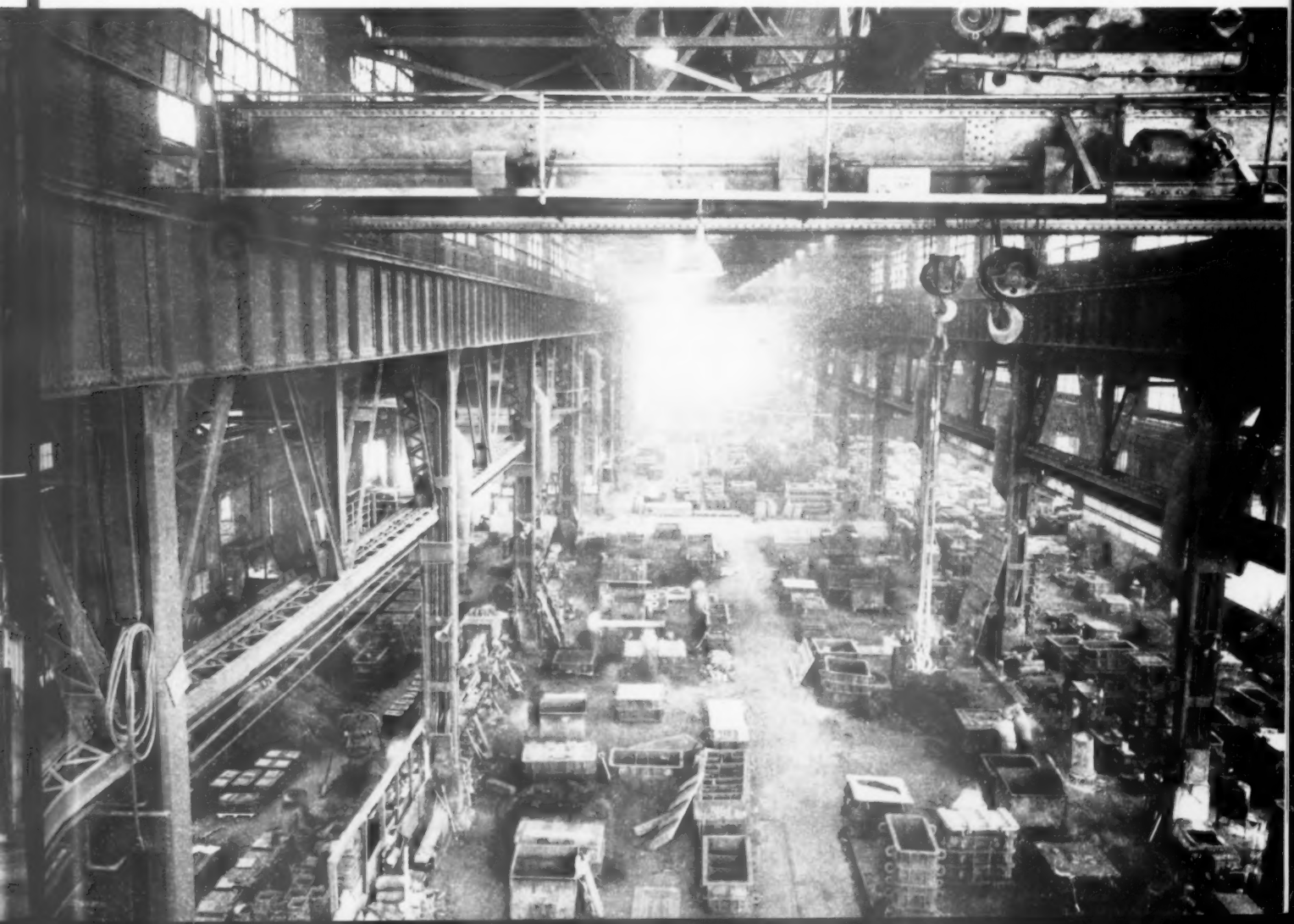
The steel foundry building of brick and steel sash construction, 603 ft long and 127 ft wide, is divided into three bays 37, 53 and 37 ft wide, respectively. As shown in the accompanying layout sketch, melting is accomplished in one 10-ton, one 25-ton and three high-frequency electric furnace units. The latter consist of two 600-lb and one 250-lb capacity units.

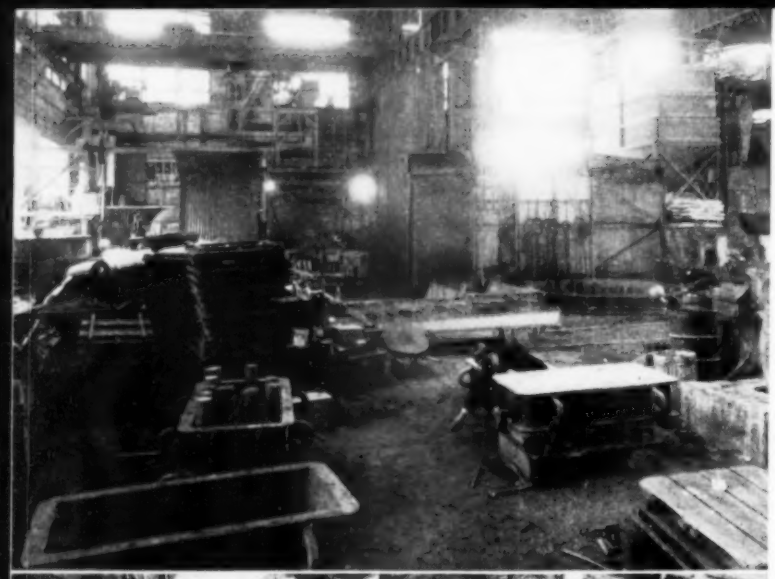
Furnaces are located along the wall of the east bay handy to the raw material storage yard just outside the building. Electric arc furnaces are approximately 200 ft from the south end of the foundry, and the high-frequency furnaces about the same distance from the north end. Heat treating furnaces and mold drying ovens are located at the south end of the west bay. Heat treating equipment consists of one large unit and five smaller units. Large heat treating furnace is 19 ft wide, 26 ft deep and 8 ft high. This is used not only for steel castings, but also for stress-relieving large welded structural assemblies produced in the sheet metal department. The small furnaces are 8 ft wide, 13 ft deep and 6 ft high. Five mold drying ovens are available for drying molds or large cores. Two of the ovens are 19 ft wide, 29 ft deep and 13 ft high, and the others are 14 ft wide, 29 ft deep and 13 ft high. A smaller core drying oven adjacent is 14 ft wide, 8 ft deep and 8 ft high.

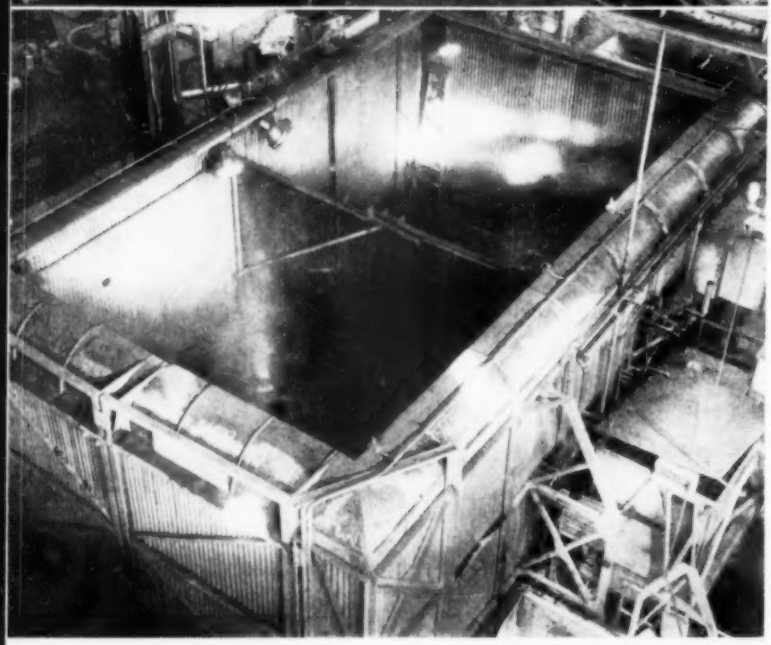
A casting pit about 20 ft wide, 35 ft long and 15 ft deep is located in the middle of the center bay near one end, and is used for producing forging ingots poured into ingot molds. Weights range up to 35 tons. The pit also is employed for pouring tall molds whose height would necessitate erection of scaffolding to provide a pourer's platform. It also is used for making large molds for which no suitable flasks are available.

Medium and heavy castings are produced in the steel foundry, and molding is performed by hand

View of center bay from south end looking north







(Left)—Wet blast cleaning units in the center; dry sand storage hopper at right. Overhead view of wet blast unit is shown in view below

or with a locomotive type sandslinger. Hand molding operations are conducted on one side of the center bay, and the slinger molding on the other. Medium molding area is approximately at the center while the heavy molding area is toward the end of the bay. Sand used is 50 to 60 grain size reclaimed from the wet blasting unit which will be described later. Sand is bonded with bentonite and cereal to provide the necessary properties for the size of casting involved.

After the molds are rammed and the patterns removed, they are coated with silica, wash, and either air dried for 48 hours, or oven dried. Selection of the particular treatment depends principally upon the size and intricacy of the casting, although in some cases it may be the importance of the time element. In general, molds for large castings and those for intricate castings are oven dried, while those for medium size castings are air dried. Oven drying also is employed for castings whose production can be speeded up by eliminating the major portion of the 48-hour air drying period.

After pouring and solidification of the castings the molds are shaken out, the procedure varying somewhat by size. All the large molds are loaded on cars and taken outside the foundry. There they are picked up by a crane and moved into the shakeout area. By using heavy vibrators attached to the flask, or by placing the molds on a vibrating grid shakeout unit, sand is separated from flask and castings. Castings are loaded on the cars and brought back into the foundry where any adhering sand and the cores are removed by wet blasting. Backing sand

(Below)—Partial view of steel foundry coreroom

removed from the flasks in the shakeout area is loaded into steel boxes and transported into the foundry where it is placed in a 90-ton elevated storage bin, or stored on the floor near the wet blasting unit.

Smaller molds are placed on a frame about 8 x 10 ft formed of steel structural members, and carried by crane to an area near the wet blasting unit. There they are removed from the frame and shaken out by means of a crane and vibrating units attached to the flasks. Castings are placed back on the frame and taken into the wet blasting unit. Backing sand shaken from the flasks later is dumped into the wet blasting unit, and washed into the system.

Wet blasting unit consists of two rooms, 16 x 20 ft, which abut to form an L-shape structure; the end of one forming part of the side of the other. Castings are cleaned in the unit by a combination of water and sand ejected through a nozzle manually operated by a man in the room. Water at 1200 psi passing through a combination nozzle entrains around 15 to 20 per cent sand fed in as a slurry from a supply tank. The combination of water and sand projected at high velocity against the casting effectively removes sand on the exterior and cores in the interior.

Sand and water from the operation flows into a sump beneath the units and are pumped up to a scalping screen which removes any large foreign particles such as scale, small pieces of wood, etc. From the scalping screen the mixture of sand and water passes into a counterflow classifier which removes the fines. That material and the foreign matter from the scalping screen flow to a settling tank from which they later are removed and sent to the dump.

From the classifier, part of the sand is pumped to the slurry feed tanks for the blasting operation, and the remainder passes into a sump. From the sump the sand and water is pumped to an elevated storage tank above a drum or rotary filter. First section of the filter, operating under ordinary atmospheric temperature, dewaters the sand from around 35 per cent down to 6 per cent moisture. Second section operating with steam-heated air decreases the moisture content of the sand to about 1 per cent. The practically dry sand removed from the filter drum is discharged into the boot of an elevator which carries it to cross conveyor belt. That belt discharges the sand into the 90-ton elevated storage bin. A 2000-lb capacity sand muller beneath the storage bin is used to mix the sand, binder and moisture in the desired proportions for molding various castings.

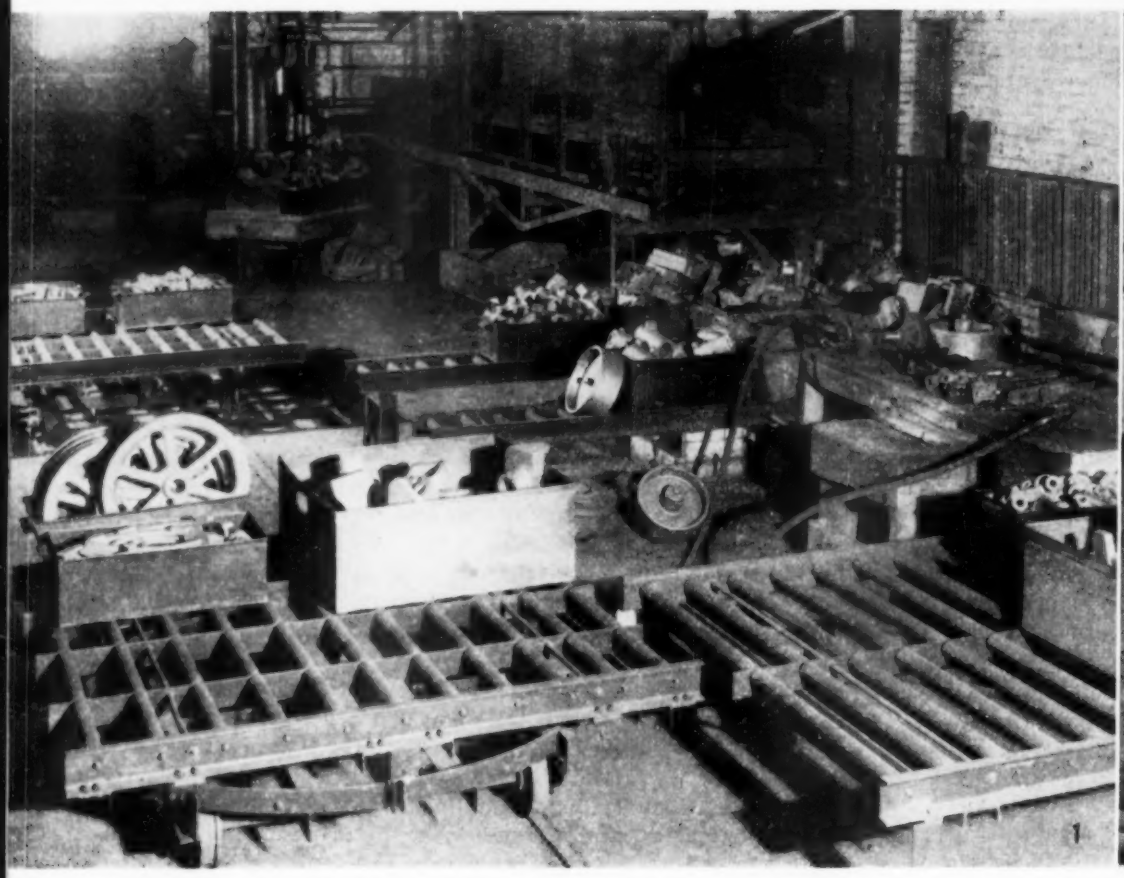
Use of wet blasting of castings aids considerably in speed of removal of adhering sand on the outside surface of the castings, and also of the cores in the interior which often is a rather laborious undertaking. In addition there is a complete suppression of dust. Another advantage of this particular unit is the overall reduction in molding sand cost through its reclamation feature. While the initial cost of a molding sand laid down at the foundry may be reasonable, disposal of a certain amount of waste sand each day may become a problem due to the lack of a nearby dump. Such was the case at the Naval Gun Factory steel foundry, and available records indicated that the overall cost of sand, including disposal, ran about $7 a ton. By reclaiming sand, present cost is about $2 a ton.

Gates and Risers Are Cut Off

After the castings are cleaned, they are taken to the opposite end of the foundry where the gates and risers are removed with oxyacetylene cutting torches. Following that operation the castings are chipped as required with pneumatically-operated chisels. Five welding booths about 5 ft wide and 6 ft deep are located along the east wall of the building, and incorporate a somewhat unusual feature. The booths contain turntables mounted about 30 in. above the floor level, and the tables are located so that one half is inside the booth, and the other half outside. Vertical panels the full width of the tables and the height of the booths, are mounted on the diameter of the tables to form the front of the booths. In operation one-half of the table is loaded with castings on which welding operations are to be performed, and the table is turned until the castings are in the booth. Then the other half of the table is loaded. The operator in the booth conducts the necessary operations within the confines of the booth which effectively shields the glare of the welding operation from the rest of the foundry. When finished, the operator rotates the table so that the finished castings are outside and a fresh batch on the inside.

Coremaking operations are conducted in approximately the middle of the west bay. Cores are made on the bench or on the floor, depending upon the size. Smaller cores are placed on racks and baked in a 14 x 8 ft oven while the large cores are baked in one of the mold drying ovens. Core sand used is silica sand of the same grain size as that used in molding, namely 50 to 60.

(Below)—Removing riser by flame cutting machine



HANDLING MATERIALS in the Cleaning Department

Equipment for handling materials in the cleaning room is discussed in this seventh and concluding article in a series dealing with movement of materials in foundries

By ROBERT H. HERRMANN
Associate Editor
THE FOUNDRY

HANDLING materials in the cleaning room presents some of the same problems existing in other foundry departments. Among these are correct planning and full utilization of the equipment available. Like the other departments, the problems will vary, depending upon whether the foundry is a jobbing shop handling a wide variety of castings of different sizes, or a specialized foundry where castings of uniform size and shape are produced day in and day out. Whichever the case may be, equipment is available to fill the need.

The illustrations in this article are a sampling of some of the various types offered. Fig. 1 shows roller conveyor transfer cars used to move tote pans of castings from an airless blast cleaning machine to the chipping stations at the right. After chipping, the castings are transported on the same cars to the grinding station. The two cars in the left of the illustration have turntable tops which may be revolved so that the rollers are positioned properly for transferring tote pans of castings to the roller conveyors which hold them while the castings are being chipped. The pans of chipped castings are carried to the other end of the room on the revolving top cars where they are transferred to a stationary top car also equipped with rollers. This car services roller holding conveyors at a number of grinders.

The foundry in this plant is located on an upper floor. Castings descend to the cleaning room on a spiral chute and are discharged onto a steel apron conveyor shown at top center in the illustration. The

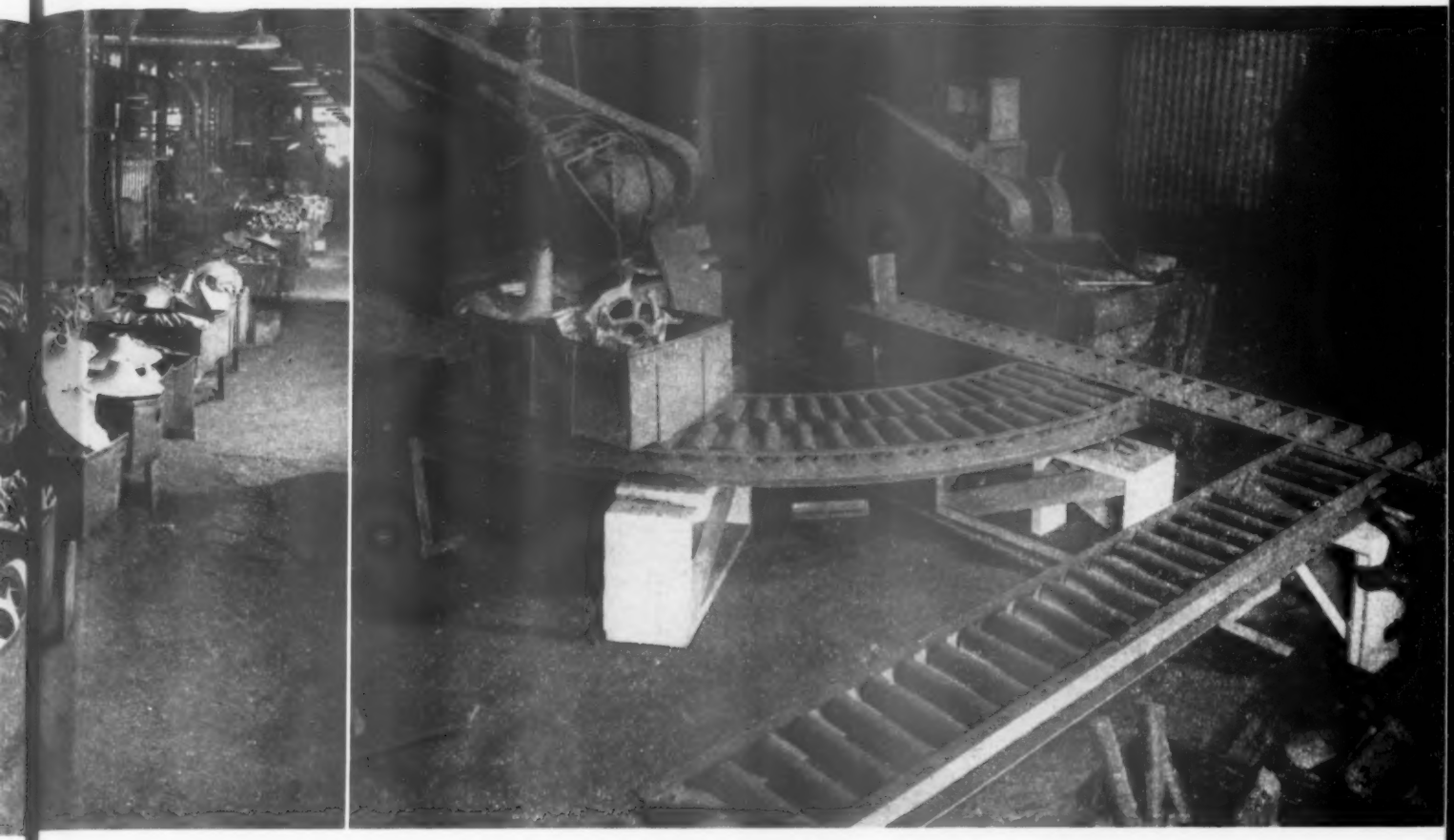


Fig. 1 — Transfer cars with revolving top roller conveyor are used to move tote pans of castings from blast cleaning machine to chipping stations

Fig. 2 — Gravity roller conveyors carry castings to and away from blast cleaning units

Fig. 3 — Transporting castings by gravity roller conveyor to stationary swing grinders

Fig. 4 — Swing grinders are suspended from short span tramrail cranes for mobility

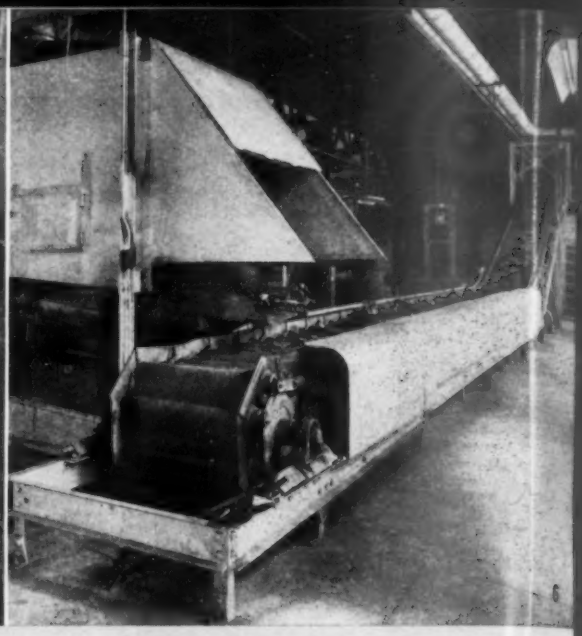
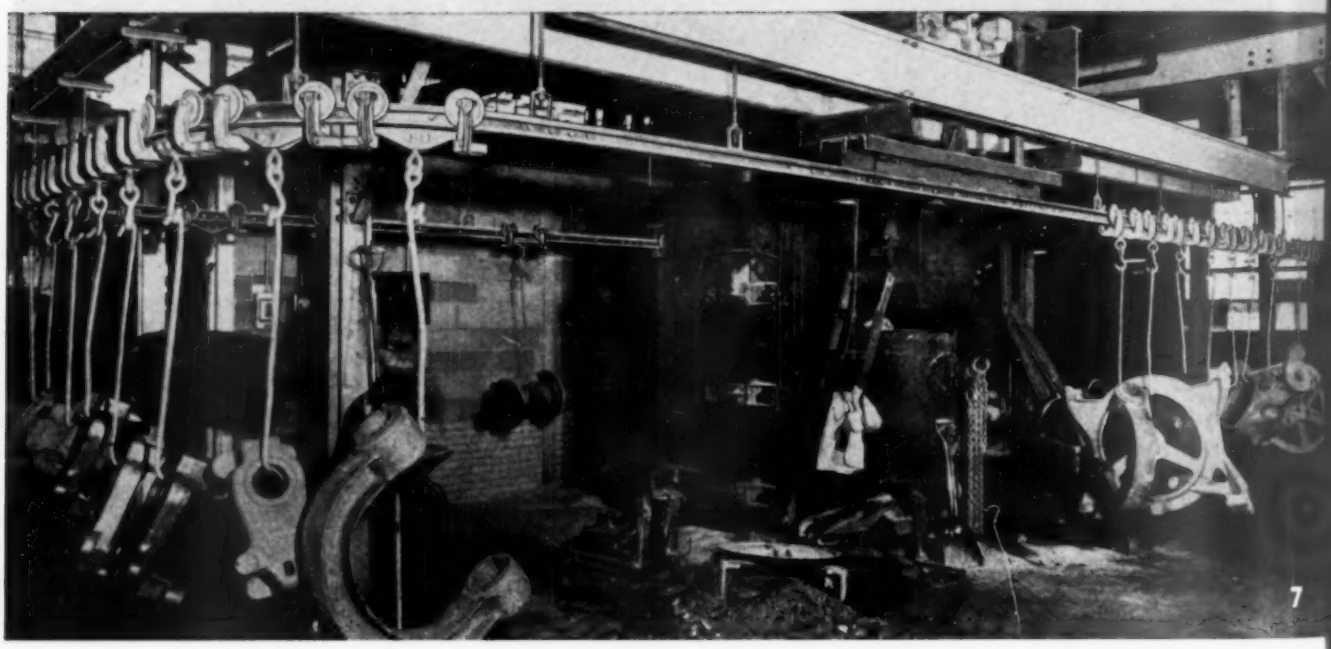


Fig. 5—Power driven apron sorting conveyor travels along row of tumbling mills. Fig. 6—Castings are transported from shakeout by power-driven steel pan conveyor to automatic cleaning equipment. Fig. 7—Monorail carries castings on hooks suspended from trolleys into and out of a sand blast cleaning room



apron conveyor feeds the castings to the airless blast cleaning unit, and is mounted on wheels so that it may be moved out of the way when the cleaning unit is discharging.

Gravity roller conveyors transporting tote boxes of castings are shown in Figs. 2 and 3. The conveyor shown in Fig. 2 carries castings to and away from blast cleaning units. Fig. 3 shows castings being carried by gravity roller conveyor to swing grinders.

The suspension of swing grinders from short-span tramrail cranes is illustrated in Fig. 4. Horizontal movement of the grinders in any direction is provided by this particular installation. Vertical adjustment is accomplished through operation of the hand-operated chain hoist.

The power-driven apron conveyor shown in Fig. 5 carries castings along a row of tumbling mills. Operators sort out castings as the conveyor moves by and toss them into the mills.

Nonstop movement of castings from an automatic shakeout to and through automatic cleaning equipment is shown in Fig. 6. This view shows the castings falling from the shakeout onto a power-driven steel pan conveyor which accumulates a batch of castings and dumps them into the automatic cleaning unit shown in the background just to the left of the inclined portion of conveyor. Castings are discharged automatically from the cleaning equipment to another conveyor which carries them past sorting and spruing stations.

Fig. 7 shows a monorail installation at a sand blast cleaning room. The castings are hung on hooks suspended from trolleys which ride on the monorail. Loading of castings is facilitated by the lift section

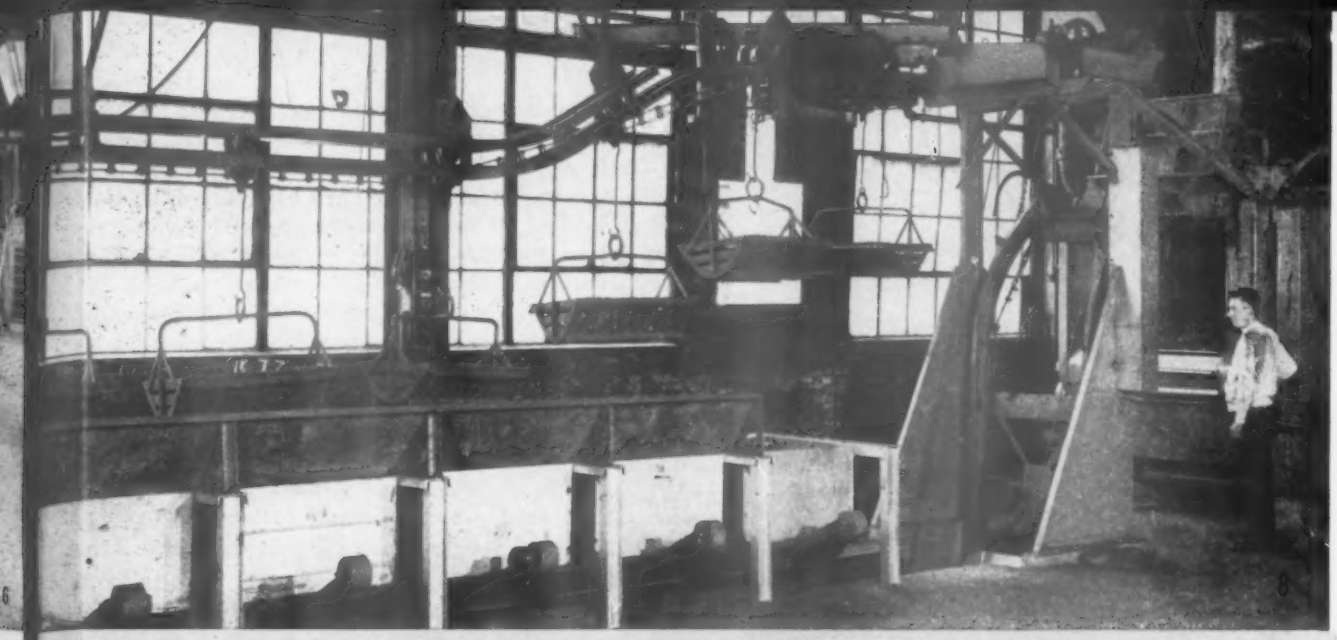
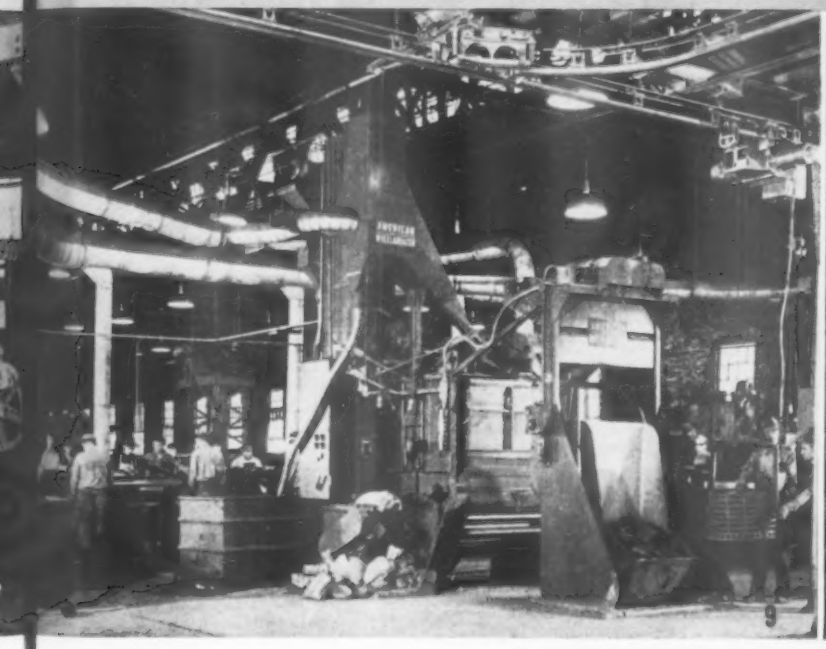


Fig. 8—Overhead conveyor carries castings in cooling baskets to sorting bins. Fig. 9—Charging an airless blast cleaning machine loader with castings carried in baskets suspended from self-propelled electric host monorail trolleys. Fig. 10—Electric hoist lifts cover from tumbling mill in preparation for unloading castings



of track shown along the empty section of monorail in the foreground. The movable section carrying one of the trolleys and hooks is lowered by an electric cable hoist and the casting is caught on the hook. Then the section is lifted into alignment with the balance of the monorail. Trolleys carrying the castings are pushed into the sand blast chamber through rubber flaps in the doors. Cleaned castings are pushed out the other end of the chamber.

An overhead conveyor carrying castings in cooling baskets to a blast cleaning machine is shown in Fig. 8. In this installaltion, five sorting bins having a capacity of 20 cu ft each, are set directly in line with

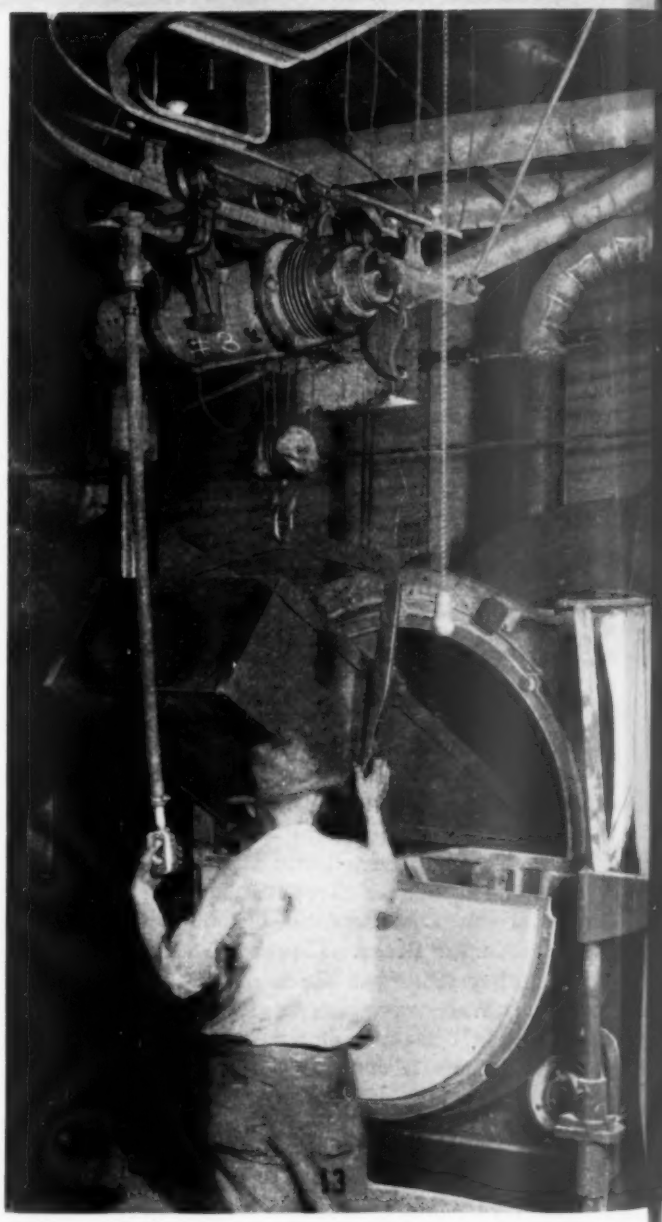
Fig. 11—Skid boxes used to supply and remove castings at grinding machines in the cleaning department

Fig. 12—Hydraulically controlled dump bucket mounted on truck is used to load castings into a tumbling mill

When the castings have been ground, the operator tosses them into another skid box which is removed by truck when full. The boxes shown here are made of heavy gage sheet steel. They are offered in standard sizes from 24 to 48 in. wide, 24 to 96 in. long and 6 to 36 in. high. Clearance height of the platform ranges from 4 to 18 in.

Loading of a tumbling mill with a hydraulically controlled dump bucket mounted on a truck is shown in Fig. 12. The bucket has a capacity of 10½ cu ft, and is 42 in. wide. Maximum dumping height clearance is 56 in. The truck pictured is equipped with a four-cylinder, 29-hp engine. The large front wheels are the drive wheels and they carry the greatest portion of the load, which provides better traction both during loading and hauling. The rear wheels, being

Fig. 13—Special tote box carried by hand-propelled electric hoist carrier charges castings into tumbling mill



the loader of the cleaning machine. The overhead conveyor carries the baskets directly over the bins so that attendants standing behind them can sort the castings from the baskets into the bins. Each bin has a counterweighted bottom which permits dumping castings from the bin into a vibrating underflow pan conveyor which moves the castings forward and spills them into the cleaning machine loader bucket. This arrangement permits small batches of different sizes and types of castings to be classified and segregated into bins before cleaning.

The handling of individual baskets of castings by self-propelled electric hoist monorail trolleys is shown in Fig. 9. This view shows a basket of castings, which has been transported from the annealing furnace, about to be emptied into a loader for an airless blast cleaning machine. Castings are unloaded from the cleaning machine into the hand truck shown at extreme left in the photo. A slanting lip on the left side of the truck is at the correct height so that it will line up properly with the machine to receive the discharged castings with a minimum of spillage.

Use of a 1-ton electric chain hoist on a wall bracket crane to lift the cover from a tumbling mill in a gray iron foundry is shown in Fig. 10. Pneumatic motor hoists also are used for such operations. One manufacturer of pneumatic hoists offers various models in capacities ranging from ¼ to 3 tons with lifts of 15 to 40 ft. Hoists designed for trolley mounting may be obtained with or without the trolley.

The handling of small castings at grinding stations is accomplished conveniently by the use of skid boxes. The box at right in Fig. 11 is built with a sliding door at one end. The box is placed on a tilting stand in such a manner that the door lines up with a metal chute that conveys the castings to a point within easy reach of the grinding machine operator, making it unnecessary for him to stoop or reach for castings.

relieved of the load, are said to steer easily and accurately.

Loading and unloading castings at a cleaning mill are shown in Figs. 13 and 14. In Fig. 13 a rigid arm, pushbutton-controlled, hand-propelled electric hoist carrier is shown charging the mill through use of a specially shaped box. Tote-box loads of castings are transported directly from shakeout and delivered to the mill without rehandling. After cleaning, the castings are unloaded manually with a rake as shown in Fig. 14 into shipping containers which are conveyed directly to storage, truck or car. Both the loading bucket and the shipping container are designed to be handled by the same bail attached to the electric hoist.

Handling large castings into and out of a sand blast chamber is shown in Fig. 15. The hoist pictured is an air motor type. It is mounted on a jib crane to facilitate movement of castings to and from the chamber car. A similar arrangement is installed on the other side of the sand blast chamber at this foundry. The manufacturer of this hoist offers models with capacities between 200 and 20,000 lb.

SOURCES OF ILLUSTRATIONS

Figs. 1, 2 and 3—Logan Co., Louisville, Ky.
Figs. 4, 13 and 14—Cleveland Crane & Engineering Co., Wickliffe, O.
Fig. 5—Jeffrey Mfg. Co., Columbus, O.
Fig. 6—National Engineering Co., Chicago
Fig. 7—American Monorail Co., Cleveland
Fig. 8—American Wheelabrator & Equipment Corp., Mishawaka, Ind.
Fig. 9—Link-Belt Co., Chicago
Fig. 10—Whiting Corp., Harvey, Ill.
Fig. 11—Truscon Steel Co., Cleveland
Fig. 12—Frank G. Hough Co., Libertyville, Ill.
Fig. 15—Ingersoll-Rand Co., New York

Fig. 14—Unloading castings from tumbling mill. Carrier is same as used for charging box shown in Fig. 13

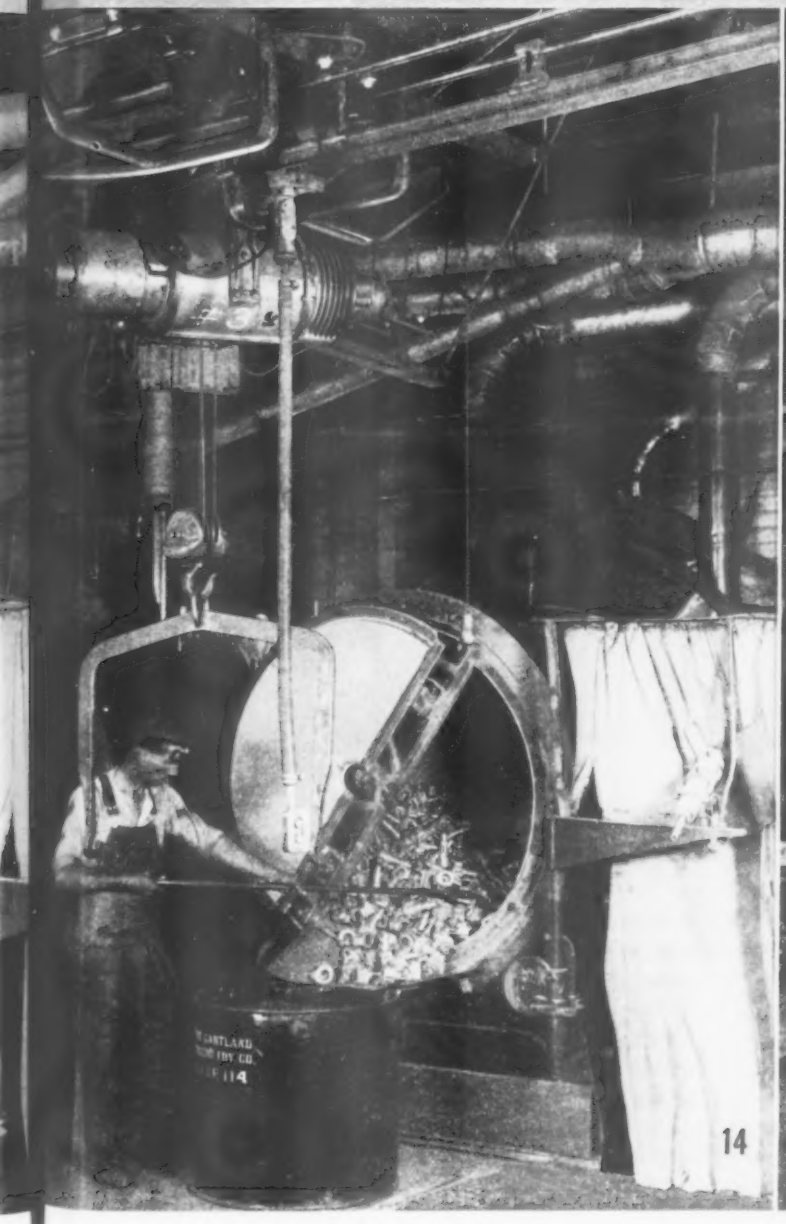


Fig. 15—Air-motor hoist mounted on a jib crane loads and unloads castings from sand blast chamber car

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American Air Filter Co., Louisville

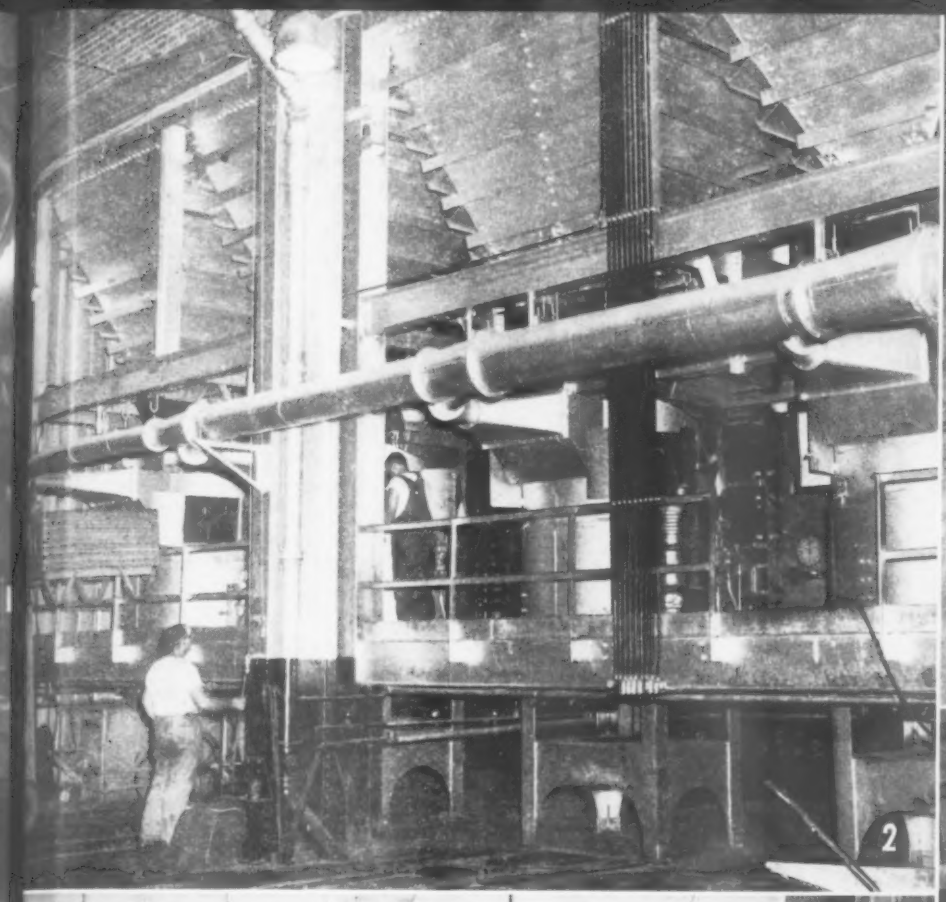
MODERN USE OF EXHAUST Ventilation

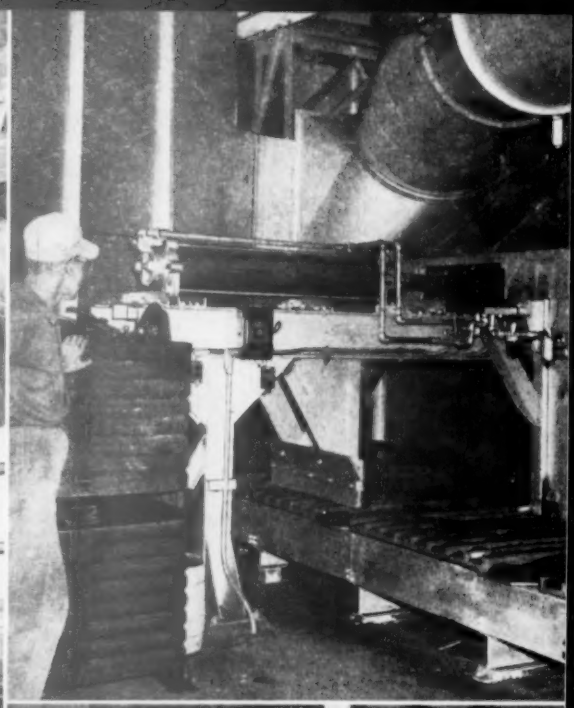
Any gray iron foundry with a melting capacity of nearly 52 tons an hour generates considerable dust, fumes and smoke. How these undesirable emissions are kept under control at the new gray iron foundry of the International Harvester Co., Louisville, is described here

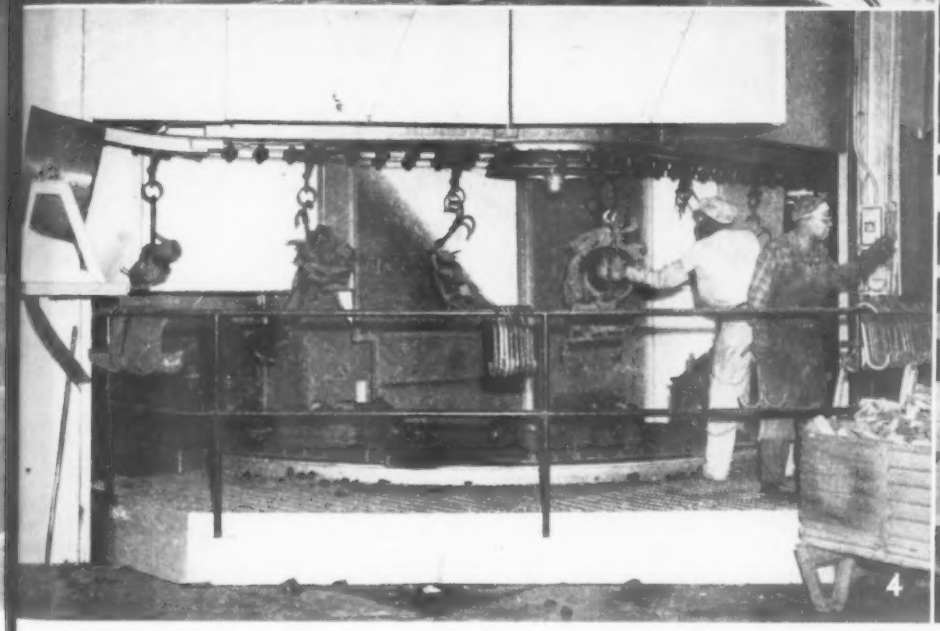
● A CLEAN PLACE TO WORK was a primary objective in design of the new gray iron foundry at the Louisville Works of the International Harvester Co. This latest unit in the company's line of foundries supplies tractor part castings for Louisville Works and has a melting capacity of 51.9 tons per hour. Foundry building, 500 x 1000 ft, contains seven mechanized molding lines. Utmost attention to all details in sand handling and material handling has resulted in minimum spillage and an outstanding appearance of cleanliness and spaciousness within the foundry during peak operations.

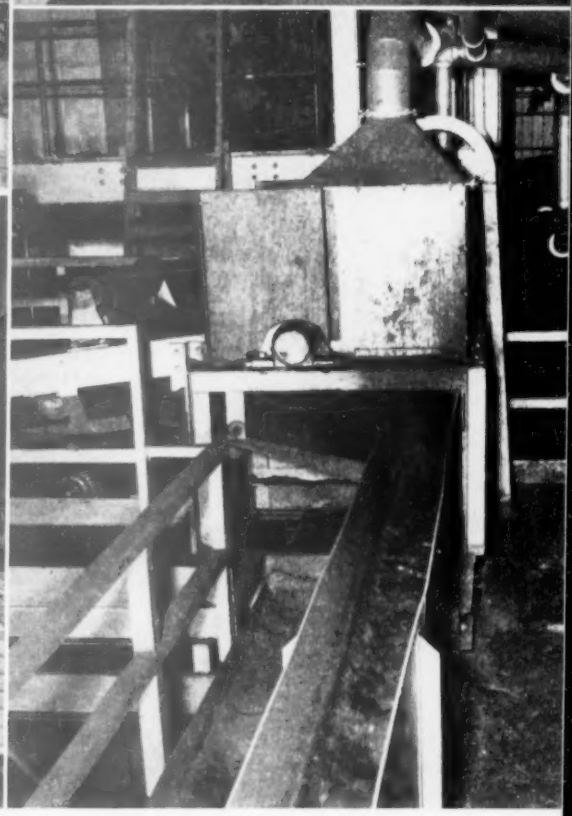
Exhaust ventilation is a major factor in keeping this foundry clean and it has been generously applied to prevent dispersion within the foundry of dust, fumes and smoke. To alleviate outside air pollution 650,000 cfm of dust-laden air is passed through twenty Type N (dry) and seven Type D (wet) Roto-Clones for collection of the foreign material before cleaned air is discharged outside. An additional 750,000 cfm ventilates cooling tunnels and pouring stations to remove smoke and gases from these operations. Still another 152,000 cfm removes smoke while castings are removed from the shakeout and placed on conveyors.

Location of the foundry adjacent to the municipal









airport has made air cleanliness around the foundry atmosphere of primary importance. Company's installation has met all requirements of the CAA and has caused no interference with air traffic. Six No. 10 cupolas are equipped with three hotblast systems. The hotblast portion of the cupola stack gases is cleaned by three Type D collectors and skimmer precleaners before the cupola gases are released. Sampling of these stack gases indicates dust loadings escaping the collector to be negligible. Approximately 7 tons of entrained solids are collected from each system per 80-hour week.

To attain the desired good housekeeping and plant

Fig. 1—Core grinder hood exhausting 4200 cfm is designed to permit grinding wheel adjustment

Fig. 2—Hooding of core sand mixer and exhaust system follow AFS Code of Recommended Practice

Fig. 3—Use of flask pusher permits complete shakeout enclosure with positive dust control

Fig. 4—Ventilation through side hood removes smoke, fumes and dust at casting removal stations

Fig. 5—Dry refuse core sand from knockouts is fed to sluice for transport to central settling tanks

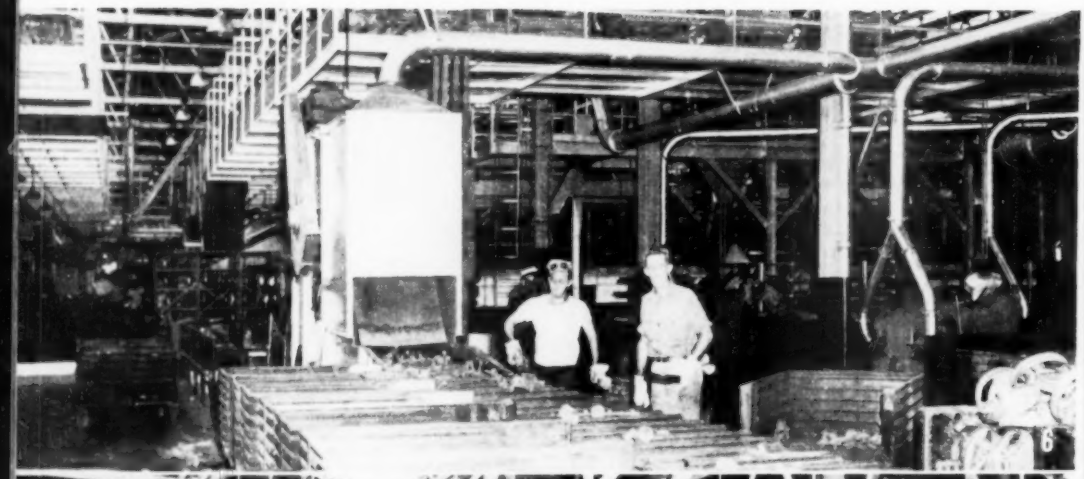


Fig. 6—Dust control with hoods at feed and discharge ends of sorting conveyor keeps fine burned sand from dispersing to cleaning room area

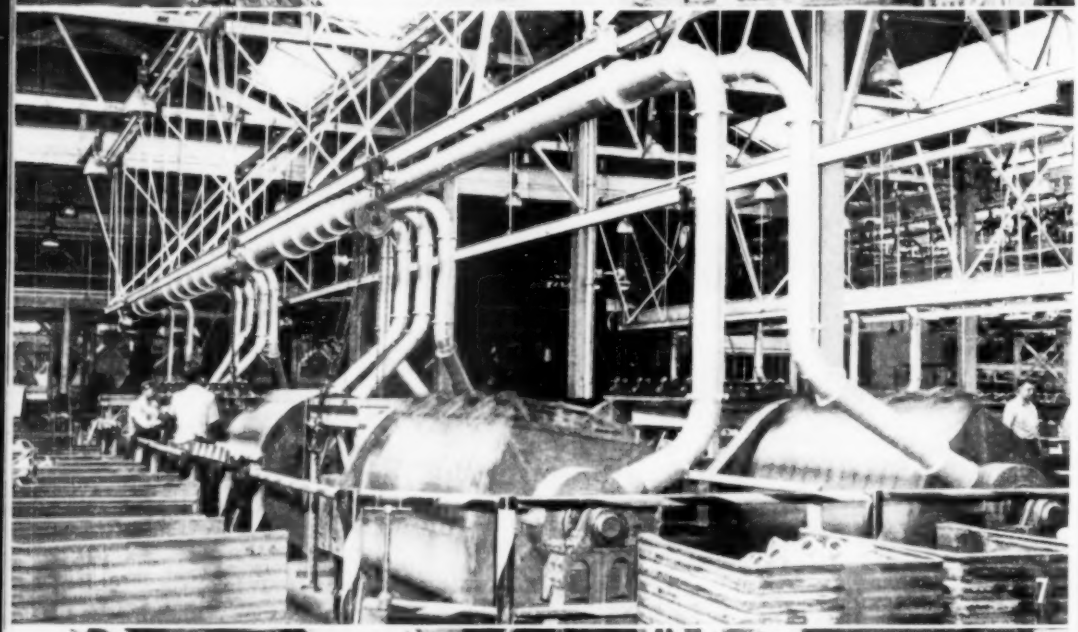


Fig. 7—Tumbling mills are specially designed for low pressure drop. Spent sand is conveyed through external ducts at sides of mill

Fig. 8—Cleaning room layout provides ample space for the 21 chipping benches and 11 pedestal grinding machines

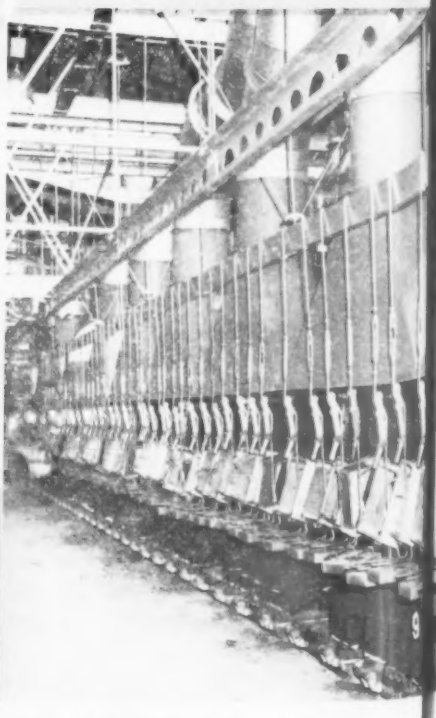


Fig. 9 — Pouring area for snap flask line is 140 ft long. Smoke and fumes removed by 92,400 cfm exhausting system

cleanliness, no refuse from sand system, cupolas, or dust collectors is transported manually. Two central sluicing refuse disposal systems hydraulically transport the waste material to outside settling tanks and furnish a central disposal point for the removal of such refuse by dump truck.

Molding Units—The seven molding units, in three groups, consist of two heavy, four intermediate, and one snap flask lines.

The two heavy units handle a maximum flask 46 x 30 in. Hourly casting output totals 20.6 tons. Pouring station for these lines extends 70 ft, and smoke and fumes are controlled by an exhaust volume of 32,400 cfm through four stack fans. Exhaust volume is sufficient to maintain an indraft of 150 fpm from edge of pouring hood to top of mold car. Typical pouring station is shown in Fig. 12.

From pouring station, flasks enter smoke tunnel and travel 250 ft before cope is removed by a hoist at the cope shakeout. Cope is fed to the 5 to 6 ft shakeouts by monorail, permitting use of overhead hood and enclosure. Dust control volume is 17,000 cfm connected to Type N collectors and 13,000 cfm exhausted from above the mold breaking station. From this point, drag and casting travel an additional 120 ft under additional smoke hoods. From the 250-ft run of smoke hood 42,000 cfm is exhausted and 16,800 cfm from the 120-ft portion.

Castings from these heavy units are transferred to a conveyor line for cooling and conveying to the core knockout. Casting removal station is shown in Fig. 4 Ventilation is provided to exhaust smoke, fumes and the small quantity of dust from these operations by an exhaust volume of 32,600 cfm. Sand spillage to the floor is removed by open subway grating which allows such material to drop onto return sand conveyors located in the basement area. The drag is removed from pallet mold conveyor by pneumatic flask pusher onto the 5 x 8 ft drag shakeout. Fig. 3 shows the complete enclosure provided for this shakeout, which is exhausted by 8800 cfm.

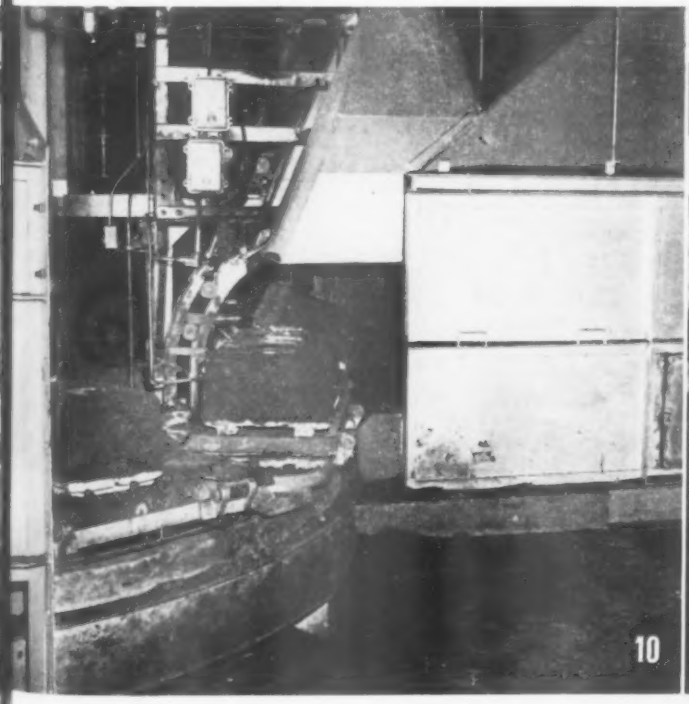
The four intermediate units, designed to handle a total of 27 tons per hour, have a 50-ft length of pouring station exhausted by 32,400 cfm maintaining 150 fpm indraft. Pouring stations, smoke hoods and exhaust ventilation are similar to the arrangements described for the heavy units. A complete room type of enclosure covers the next 370 ft of conveyor travel, with smoke and heat exhausted by 42,000 cfm. Cope removal station, exhausted by 10,000 cfm to collectors and 13,900 cfm of general ventilation, is arranged similar to the heavy unit operations. Cope shakeouts for these units are 4 ft x 6 ft.

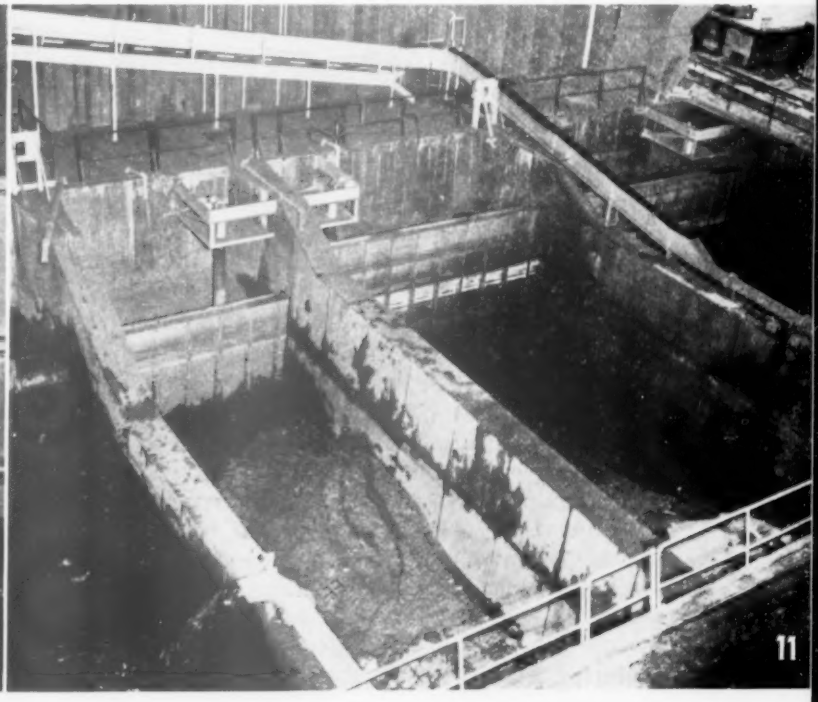
After casting and drag travel an additional 110 ft through smoke and cooling tunnel (16,800 cfm of exhaust ventilation at that point), castings are manually transferred from flasks to the 3 x 6 ft vibrating shakeout. To prevent dust dispersion from this operation 6000 cfm is exhausted from the complete enclosure. Castings discharged from the vibrating shakeout are fed into basket conveyors for cooling and moving storage. Ventilation at the basket feed points is 13,200 cfm while an additional 8400 cfm is exhausted above the conveyor at the point where casting is broken from the flask. The 4 x 4 ft drag shakeout is exhausted by 6000 cfm.

On the snap flask units, four indexing trains handle 825 flasks, 4.3 tons, per hour. Pouring area, 140 ft long and exhausted by 92,400 cfm, sufficient to maintain a 150 fpm indraft, is illustrated in Fig. 9. The 325 ft of cooling tunnel is ventilated by an

Fig. 10—Effective device holds bottom boards to pallets as mold is automatically upset at the shakeout

Fig. 11—Sluice water is delivered to two pairs of dewatering tanks, one pair handling the sand sluice system and the other the slag sluice system





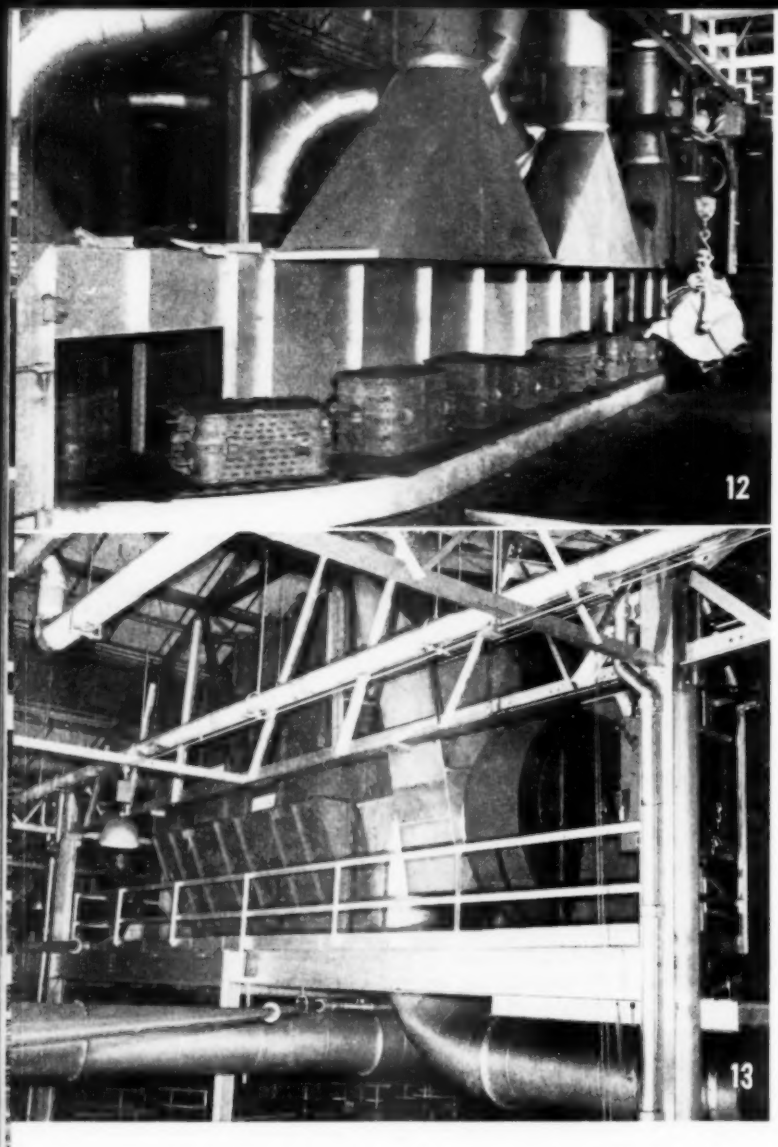


Fig. 12—These exhaust hoods are typical of ventilation supplied for heavy and intermediate lines

Fig. 13—Dust collectors are mounted overhead to save floor space

additional 42,000 cfm before flask and casting are upset onto the 4 x 10 ft vibrating shakeout. Shakeout arrangement shown in Fig. 10 is ventilated by an exhaust volume of 9000 cfm. An apron conveyor transfers castings from shakeout to sorting conveyor. Exhaust ventilation at the discharge of the apron to collect the dust released by dropping of the castings to the sorting conveyor is controlled by the hood shown in Fig. 6. Exhaust ventilation is also provided at the far end of the sorting conveyor to pick up dust released as sprues, burned sand and other refuse is dropped into the refuse container.

Sand Conditioning Systems—Shakeout sand is delivered to four sand conditioning systems centrally located in two sand towers. Conventional exhaust ventilation is provided for the transfer points, bucket elevators, hexagonal screen and bin ventilation. In addition, return sand conveyors are hooded from the point of shakeout hopper discharge to the hexagonal screen inlet. Additional sand cooling is obtained by passing the hot sand through a cooling barrel before delivering it to the sand bins. Exhaust air from the barrel is also regulated to provide fines control at this point. A total of 108,700 cfm is exhausted from the sand conditioning operations. Typical volumes and branch sizes for some dust production points are:

	Duct Diam, in.	Cfm
Hexagonal screens	11	3000
Head end of bucket elevator	8	1500
Conveyor to cooling barrel	8	1500
Cooling barrel	16	6900
Sand hopper	2-8	3000
Enclosed mixer room	3-7	3500

Core Sand System—Core sand from outside covered storage bins is fed by belt conveyor and bucket elevators to a direct-fired core sand rotary dryer. Exhaust ventilation and dust control for the conveyors, elevators, dryers, bins, and mixers is provided by three Type D collectors with skimmer precleaners exhausting a total volume of 40,000 cfm. Hooding and exhaust duct connections for the core sand mixers are shown in Fig. 2.

Baked cores are finished on core grinders where an exhaust hood, illustrated in Fig. 1 has been designed to both rotate and elevate to meet changing locations of the grinding wheel. An exhaust volume of 4200 cfm prevents dispersion of fine core sand from each of four such units.

Cleaning Room—Before castings from the heavy molding lines are delivered to the cleaning room, cores are removed by two 5 x 10 ft vibrating core knockouts. Dust control for these operations involves the exhaust of 10,000 cfm from each of the two overhead hoods plus an additional 8000 cfm each exhausted from side hoods where sprues and burned sand are removed prior to placing the casting on the core knockout.

Exhaust ventilation for the cleaning room requires 147,300 cfm. Equipment includes two 36 x 42 in. and one 48 x 72 in. airless (*Please turn to page* 247)

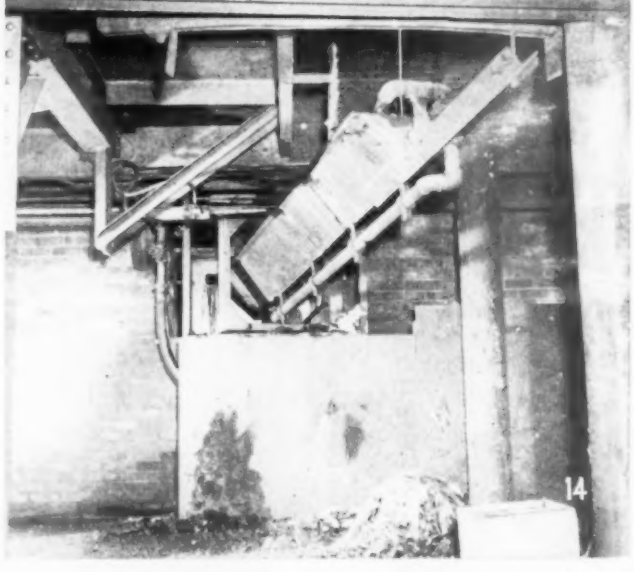


Fig. 14—Recirculated water is introduced at end of each cupola slag trough, quenching slag and transporting it to central slag settling tanks

By JOHN HOWE HALL
Consultant
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STEEL FOUNDRY CORE AND MOLDING SANDS

Continuing his discussion of sand reclamation methods, the author also describes the development and application of cement-bonded sands in this sixth of a series of articles devoted to steel foundry sand practice. The concluding article will be presented in the October issue

IN AN effort to remove both the inert fines and the carbonaceous coating on the sand grains, reclamation by heating the sand in large rotary kilns to a temperature high enough to burn off the carbonaceous material, has been attempted in several installations. The sand is generally first screened or sent over a cascade to remove the dust and lumps. The latter may be broken up in a hammer mill and added to the screened sand, which then moves slowly through the rotary kiln, and is heated to about 1400° F. From the fired kiln the sand is discharged into a second barrel in which it is sprayed with enough water to bring it to usable temperature. A good deal of the dust is carried out of the fired kiln with the hot products of combustion, and still more is removed by sending the sand through some sort of agitating apparatus such as a high-speed sand muller provided with an exhaust fan.

A thermal reclaiming unit of this type has successfully treated sands in nonferrous foundries, and in at least one instance satisfactory sand was thus produced in steel foundry where bentonite, cereal and lignin were the only binders used. This reclaimed sand was free from adhering carbonaceous matter, was low in fines, and was successfully substituted for new sand in facing mixtures and in cores of several different types. The plant, however, did not operate long enough to prove definitely that bentonite-bonded sand can be thoroughly cleaned in this way.

When bonding clays instead of bentonite are used in the sands, plain thermal reclamation is unsatisfactory, because the high temperature required to burn off the carbonaceous residue partially sinters the clay adhering to the sand grains, so that it can not be removed by any sort of mechanical agitation and air or water cleaning. The green strength of mixtures in which this sand is used is higher than that of those composed of new material, but the dry strength is so greatly reduced that the sand is unsatisfactory for clay or bentonite bonded mixtures, and even less so for oil sands.

To competely remove both the fines and the carbonaceous coating on the sand, it has been found necessary to first put it through a wet cleaning unit to remove the fines and the clay, and then burn it at around 1300 or 1400° F to destroy the adhering carbonaceous matter. The sand is mixed with water and agitated in a scrubber until the clay and fines are thoroughly loosened from the grains, then put through a counter-current or rake-type classifier in which the fines are floated off and the water content reduced somewhat.

Carbonaceous matter is burned off and the the water entirely expelled in a kiln of suitable type. A cooler then reduces the temperature of the sand enough so that it may be handled on belts and, if desired, a screen or cascade unit separates the coarse from the fine sand. Sands that have been cleaned and burned in an installation of this type are equivalent in every way to new washed and dried sands. Of course, if all or part of the new sand purchased is crude silica containing a small amount of clay bond, the reclaimed sand will differ from the new in being practically free from clay.

The grain size distribution of sands reclaimed in this manner has been found to be almost exactly the same as that of the new sands brought into the shop. In particular, it has been shown that heating the sand to a red heat has not broken up the grains or reduced them in size at all. There is a slight change in color, the new sand being white or very light yellow, the reclaimed slightly reddish. Examination under a microscope, however, shows the grains to be in every other way identical to those of new sand, and in the foundry the reclaimed material is successfully used for both facing and core sand.

By cascading the backing sand before sending it to the mullers and putting enough through the reclaiming plant to make up the facing and core mixtures, sand consumption has been reduced to a small fraction of what it was when all new sand was used in facings and cores.

The cost of reclaiming (*Please turn to page* 240)

QUESTIONS and A

Low Phosphorus Is Specified

Q.—We are figuring on making some cast iron pans weighing about 450 lb, and the composition specified is 3.40 to 3.75 per cent TC, 0.50 to 1.0 per cent Mn, 0.06 per cent max S, 0.17 per cent max P, and 1.35 to 1.75 per cent Si. Our pig iron analysis is 2.0 per cent Si, 0.46 per cent Mn, 0.044 per cent S, and 0.70 per cent P. We have a good grade of scrap such as flywheels, pulleys and some auto parts. Can you tell us what to use with our scrap and pig iron to get the analysis required, especially the phosphorus? Could it be ladle mixed or should it be added in the cupola? We will pour only six castings in one heat.

A.—The low phosphorus content specified for the pans makes it practically impossible for you to use much of the pig iron and scrap that you have available. In fact, any quantity over 150 lb would probably result in the phosphorus content exceeding the 0.17 per cent maximum, and that is assuming the remainder of the charge being mainly 0.05 per cent maximum P steel scrap with sufficient silvery pig, ferrosilicon briquets, etc. to bring the silicon up to the desired range.

For example, a charge consisting of 150 lb of your pig iron, 700 lb steel scrap (0.05 per cent P), and 150 lb silvery pig (0.15 per cent P, 10 per cent Si) will give an iron containing about 1.60 per cent Si (providing the average silicon loss in your cupola is 20 per cent) and 0.16 per cent P. Similarly a charge consisting of 150 lb of pig, 850 lb steel scrap and seven 2-lb silicon briquets would give about the same composition. If the average silicon loss is less than the assumed 20 per cent, a suitable decrease of the high-silicon content materials would have to be made with an increase in the steel scrap, and since the manganese content also will be low, about 5 lb of 70 per cent ferromanganese should be added to each 1000-lb charge.

Teeth Breaking off Sprockets

Q.—We have some trouble with teeth breaking off plain gray iron gears, sprockets and pinions, and understand that such castings are being flame hardened. We would like to obtain some information on the process as well as experience and results that have been obtained.

A.—Flame hardening of certain types of castings, including gears, etc., is intended to increase wear resistance, and will not help your problem except indirectly. By indirectly we mean that cast irons to be flame hardened contain alloying agents such as nickel, chromium, molybdenum, etc., and hence possess much higher mechanical properties than the plain gray irons.

It appears that your present gears lack suitable shock resistance. That could be overcome by using an alloy iron which has good shock resistance, or the gears might have to be heat treated to obtain the desired results which would, of course, increase the cost. Our suggestion would be to try alloy iron gears without heat treatment, and see what results are obtained. Possibly the gear, sprockets, etc., are not designed to withstand the shock loads encountered from time to time, and it might be wise to consider that point before changing the material.

Change from Dry to Green Sand

Q.—We are making bronze valves containing 86 per cent Cu, 8 per cent Sn and 6 per cent Zn in molds dried in continuous ovens. Sand is silica bonded with bentonite. We would like to have some information on casting in green sand molds, keeping in mind the requirements of soundness in relation to water and gas tightness.

A.—Production of bronze and brass valves in green sand is the rule rather than the exception in this country, and those products meet all requirements relative to solidity and gas and water tightness; but that information is of little value to you unless you can adapt it to your foundry procedure. Since you do not give any information on the grain size of the sand employed at present or whether the castings are made by hand or machine, it will be somewhat difficult to supply any definite data.

In general, the sands used in brass and bronze molding are natural type in the fine classification; that is, grain size may vary from 140 to 199 AFS, and clay content from 10 to 15 per cent. Choice of grain size will depend upon the surface smoothness desired. The practice is to employ as fine a sand as possible which will not give trouble from surface blows due to lack of permeability. In general, if the sand possesses a permeability of 12 to 20 and a green compression strength of 5 to 7.5 psi it should work satisfactorily. For example, one foundry uses a sand with 190 AFS grain size, 12 to 17 permeability, and 6 to 7 psi green compression strength, while another employs a sand in the range 140 to 199 AFS grain size, 18 to 20 permeability, and 5 to 6 psi green strength.

We imagine that your present sand is of suitable fineness to produce the requisite surface smoothness, although possibly it may be too fine when used in a green sand mixture. However, the only way to determine that is to make up an experimental batch, using clean silica sand with 4 per cent bentonite and 3.5 per cent moisture, and note the results. If surface blows occur, the sand probably is too fine, and

Answers

a coarser grade should be tried. However, before making that change it may be advisable to check your ramming conditions. Usually in dry sand work the sand can be rammed hard since the drying operation eliminates moisture and leaves the mold permeable. In green sand molding ramming must be adjusted to provide a mold which, while sufficiently firm, still possesses enough permeability to permit steam and other gases to escape.

If you have testing equipment to determine such properties as permeability, green strength, and moisture content of the sand, it should not be difficult for you to tailor-make a satisfactory green sand mixture. Otherwise you will have to develop the mixture by the longer cut-and-try methods.

Corrugations for Stiffness

Q.—We have seen a reference to the use of longitudinal channels or corrugations which gives strength, and permits use of a lighter weight metal. Can you give us any information on that?

A.—Corrugations generally are used in castings and other fabricated materials primarily to provide stiffness instead of resorting to increased section thickness or use of ribs. In some cases it may be employed to provide greater surface area for cooling or heating purposes. With identical cross sections the stiffness of a structural member is governed by the modulus of elasticity, and that value for light metals and alloys is lower than for ferrous materials. Hence, with light metals where increase in section to provide desired stiffness might lead to an unfavorable weight ratio compared with ferrous materials, use of corrugations or ribs could solve the problem.

Producing Large Iron Kettles

Q.—Our foundry is interested in making large cast iron wash or laundry kettles that are used by so many farm people in this part of the country, and we would like to know where we could get patterns for them.

A.—We do not know of any patternmaking firm which would have stock patterns on hand for the pots or kettles you want to make. They would have to be made to your order. Possibly some foundry that has recently gone out of business, or one that ceased making pots might have patterns, and those would have to be located by advertising your needs as to size, shape, etc.

Possibly you could locate a used kettle in good condition and use it for a pattern after cleaning it up since patterns for kettles from 2 to 4 ft in diam usually employ iron patterns of the same shape. Procedure is to place the pattern in a follow board, mouth up, to the full depth. Kettle opening then is filled with molding sand and tramped off lightly. Drag flask is placed on the follow board, filled with sand and rammed firmly. After venting the mold, the bottom board is rubbed on, clamped and rolled over. Follow board is removed and replaced with a cope which may be in one or two parts depending on the depth of the kettle or pot.

Lugs, handles or trunnions on the kettles may be formed by attaching loose pieces to the pattern or by using ram-up cores carrying the impressions. Loose pieces are employed where accuracy is desired in locating the position of the lug or handle. Castings are poured through two or more small pop gates placed directly on top, and connected to a pouring basin on the upper side of the cope.

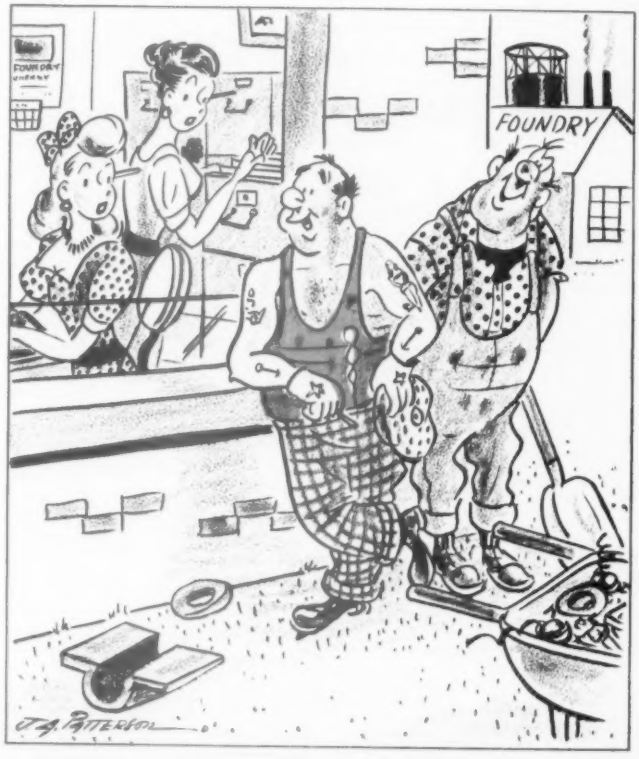
Has Trouble From Inclusions

Q.—We are attempting to make spool type bearings using miscellaneous steel scrap from our machine shop, such as shaft ends and automobile scrap, and a good grade of mill gray iron scrap. Our cupola is 20 in. inside the lining and we are at present using a 30-70 mix. Castings are hard and metal comes hot, but we are having slag inclusions near the gates. Design of the casting makes a change in gates difficult. Can you suggest a way to remedy our problem and still get hard iron? We can get steel clippings from a local plow concern. Would that be better than our miscellaneous steel scrap?

A.—Without a specimen to examine to determine whether your trouble is inclusions or something else, we can only offer suggestions as to possible remedies.

GANGWAY!

By J. A. PATTERSON



"Pardon me, ladies—Mr. Northgate here has what I think is a perfectly wonderful idea for tonight."

First of all, since the defects are located near the gate, we wonder if the trouble arises from washing or cutting in that vicinity. You mention that your iron is hot, and it may be that the sand is not in proper condition to withstand the stream of metal for the period of time involved.

We assume that care is taken in skimming the ladle before pouring, but an added precaution would be to use a perforated skimmer core in the sprue or close to it to remove any entrained material in the iron. If the defects are inclusions, they might result from the bed in the cupola being too low, causing the iron to melt under oxidizing conditions. Again. those might come from including some nonferrous alloys such as aluminum along with the scrap.

The steel clippings you mention will not be as good as your present steel scrap because they have a large area compared to their volume, and will be subject to oxidation before melting.

Prevent Zinc Fume Evolution

Q.—Some time ago we saw an article in THE FOUNDRY relating to melting brass, and mention was made of a flux employed to suppress the evolution of zinc fumes. Can you tell us the composition of the flux?

A.—We do not have any information on the specific details of the flux, but there are a number available which could accomplish the same results. Names and addresses of manufacturers who supply proprietary cover fluxes may be found in the Where-to-Buy Directory on page 267 of this issue. One common material which forms a tight cover is broken glass. Others include a mixture of borax and sodium carbonate or soda ash; clean dry sand, etc. Where the yellow brass does not have to withstand pressure a small amount of aluminum sometimes is added, about 1½ oz per 100 lb, and it forms an oxide skin on the surface which aids in suppressing the zinc fumes.

Small Cupola Melting Slowly

Q.—In our foundry in Brazil we have a cupola lined to 30 in. which melts 2 tons per hr. We would like to know what maximum size casting in pounds can be made; what size blower must be used; the area, number and size of tuyeres, and the height of the tuyeres above the bottom. We would also like to know the general rule which determines approximately the maximum size casting which can be made with a cupola of known operating characteristics. In addition, we would like to know what composition of iron is most suitable for small and medium size castings. We use charcoal pig iron and coke with a sulphur content of 0.8 per cent.

A.—It appears that your 30-in. diam cupola is melting slowly as we would expect the rate to be from 3 to 3½ tons per hr. For a melting rate of 3 tons per hr the blower should be able to supply about 1650 cu ft of air per minute while for a 3½-ton melting rate it should supply 1900 cfm. Tuyere area of the cupola should be about 15 per cent of the cross-sectional area, or 106 sq in., and we would suggest six tuyeres 3 in. high and 6 in. wide. Bed should be from 40 to 48 in. above the tops of the tuyeres. Coke splits between charges should be standardized and maintained at 60 lb, and the weight of iron varied to obtain satisfactory ratios. That is, if a 1:8 ratio is desired, the iron charge should be 480 lb; a 1:10 ratio the iron is 600 lb, and a 1:6 ratio the iron weight 360 lb. Best ratio will have to be determined by experiment.

Height of the tuyeres above the sand bottom may vary from a few to 24 in. or more, but often the distance is based on a capacity of the well to hold about two charges of molten iron to provide good mixing. Assuming that the metal charges are 480 lb, the tuyeres should be about 18 in. above the sand bottom, and the slag hole about 4 in. below the bottoms of the tuyeres.

Size of casting that can be poured from a cupola melting 3 tons per hour will depend largely upon the temperature of the iron emerging from the spout, and the pouring temperature required for the casting. In the case of large, heavy-section castings, it is not unusual for the iron to be held several hours until a sufficient quantity is collected to pour the casting. This requires large ladles with thick linings, and the molten metal is covered with charcoal screenings to minimize heat losses. Before any metal is placed in the ladle, the latter is heated until the lining is almost white hot.

If the temperature at the spout is around 2800°F, and over the period of an hour the drop in temperature would not be over 100 to 150°F, you could pour a casting requiring 3 tons of metal including the gating system.

Removing Aluminum From Brass

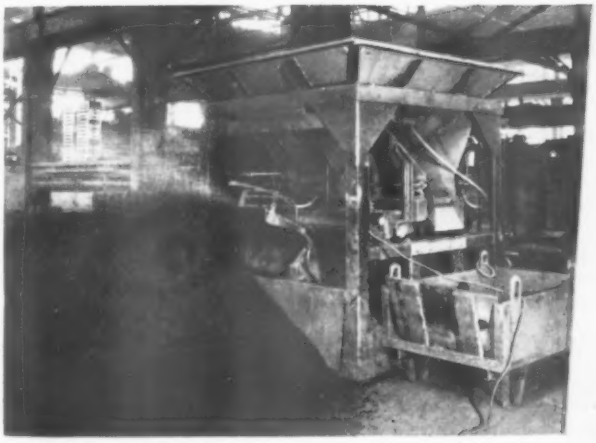
Q.—In our foundry in Argentina we are casting plumbing goods and are having grave difficulty with our metal supply which we purchase in ingot form from local scrap refiners, our only available source of supply. All the ingot metal is contaminated with up to 1 per cent Al, the lowest analysis showing 0.6 per cent. Copper usually is in the neighborhood of 70 per cent, Sn 1.5 per cent, Pb 3 to 4 per cent. Can you tell us what treatment could be applied to get rid of the Al content during melting? We melt in oil-fired crucible furnaces and in one low-frequency induction frurnace. We have used with success a proprietary material of British origin, and have seen other compounds advertised, but the exchange position in this country *absolutely* prohibits importation of such materials. Therefore, we would like to know some basic chemical components which would eliminate the aluminum contamination. Regarding the possibilities of using a flushing gas—at the time of writing this we believe that supplies of such gases are not available here, but we would like to have details on any such treatment.

A.—While small amounts of aluminum can be removed from copper-base alloys by the use of various fluxing agents, it is an entirely different matter to take out around 1 per cent of that element. Removal of the aluminum is accomplished by oxidation or changing it into a volatile compound. For example,

(*Concluded on page* 118)

ROYER COMBINATIONS

for Complete Sand Conditioning



● Model NDC—15 to 25 tons per hour

● Model RC—30 to 50 tons per hour

Today high costs and production requirements are major problems in every foundry . . . a Royer Combination Scrap Remover and Sand Separator-Blender can be a big help in their solution.

The Royer Combination is a complete, portable sand conditioning unit that can be carried by overhead crane to any location in your foundry. It removes scrap and trash . . . thoroughly mixes, blends and aerates the sand . . . provides even moisture distribution . . . and increases permeability 10 to 20 points. Available in two sizes with capacities of 20 to 25 and 40 to 50 tons per hour.

Sand conditioning costs are cut as much as 50% over manual operations and new sand requirements are greatly reduced. The properly prepared molding sand will improve your casting quality, cut discount losses and eliminate much of your cleaning and grinding time.

Royer equipment is in use today in foundries all over the world—cutting costs and increasing production. Write for complete information on how the Royer can help you.

ROYER

FOREMOST IN SAND CONDITIONING EQUIPMENT

ROYER FOUNDRY & MACHINE CO.

159 PRINGLE ST., KINGSTON, PA.

QUESTIONS and Answers

(*Concluded from page* 116)

aluminum can be removed by use of copper oxide, but some zinc also is removed, and in your case you probably would lose too much zinc.

In the December, 1949 issue of our Swedish concontemporary, *Gjutereit,* Larsson described the use of fluoride-containing fluxes which he claimed reduced the aluminum content of copper-base alloys from 0.3 to 0.01 per cent in 10 minutes, and you might try those. One flux was composed of 7 parts by weight of calcium fluoride, 2 parts sodium sulphate and 1 part sodium carbonate. The other contained 2 parts by weight of calcium fluoride, 2 parts cryolite, 2 parts sodium sulphate and 1 part sodium carbonate. Metal was heated to about 100°C above its liquidus (about 940°C for your alloy), and 1.5 per cent flux by weight added and stirred in well. The fluxes, of course should be kept dry.

Other materials used for removal of aluminum from copper-base alloys include barium sulphate alone or in combination with other compounds. For example, one foundryman claimed that a mixture of 4 lb barium sulphate and 4 lb of dry slaked lime added to an 800-lb heat of metal at high temperature and stirred in well removed aluminum contamination in the heat. Amount of aluminum was not mentioned but probably was not more than 0.1 to 0.2 per cent. Another barium flux suggested contains 84 lb barium sulphate, 10 lb barium chloride, 5 lb sodium carbonate, and 1 lb fine charcoal.

In gas fluxing to remove aluminum, it would appear that dry chlorine gas should form volatile aluminum chloride. Blowing dry air through the metal probably would form aluminum oxide, but it also would form considerable zinc oxide due to the high zinc content of your alloy. Possibly one of the volatile chlorides, such as zinc chloride or ammonium chloride, might combine with the aluminum and remove it.

Coloring Steel Articles Black

Q.—We have developed the idea and designs for jewelry in hand-wrought iron, and would appreciate information on the following: Is there actually any form of iron which is black clear through rather than gray? The models we now have are coated with dull black which in all probability will be lost with time and wear. If there is no all-black iron, can it be metallized with a dull black finish in some way similar to electroplating? Would it stand up well? If all-black iron and iron metallized with a black finish are out of the question, what finish could be given to the natural iron to preserve its looks and to guard against rust, etc.?

A.—So far as we know all of the ordinary ferrous materials have a gray or steel-like color unless they have been subjected to some treatment or exposure. A number of processes are available for providing black coatings on steel and iron which are used industrially, and presumably stand up well. However, it might be a different story if those coatings come into contact with perspiration, for example. Coatings in the main are oxides of iron, differing from rust in color and in that they are tightly adhering. For example, a black color may be obtained by immersing the object in a bath composed of 400 grams sodium hydroxide, 10 grams potassium nitrate, and 600 cc water. Solution is heated to 250 to 285°F, and the color develops in 15 to 30 minutes. Objects are rinsed in hot water, dried and immersed in hot oil.

Another method is to heat the objects to 750°F in a rotary furnace and add about 1 oz of linseed or fish oil. Revolve for 3 to 10 minutes more, and cool. The dip is a rust-retarding oil. Several commercial procedures are available which are claimed to be quick and easy to conduct, and we suggest that you write to the manufacturers relative to materials and methods. Still another method is to treat the objects similarly to automobile bodies and other parts to prevent rusting. Method generally is known as phosphating or phosphatizing, and consists of immersing the parts in a solution composed of ferric phosphate, ferrous phosphate, and manganese oxide. Color obtained is gray, but immersion in paraffin oil turns it black. Information on procedure may be obtained from the manufacturers.

Soil Pipe Interior Is Rough

Q.—We are trying to make soil pipe centrifugally and are having some difficulty in getting the bore smooth. Pipe is uniform in thickness but feels like extremely coarse sand paper to the touch. For our experiments we are using a mixture of three or four sands. Barrel of the casting box is drilled with 5/16-in. holes 2 in. apart for vents, and the rotating speed is over 800 rpm.

A.—Inability to secure a smooth bore may result from any one or a combination of three possible causes. First is the lack of careful skimming of the iron just before it is poured into the mold. Unless this is done carefully, particles of slag and dirt are carried in and, being lighter than the iron, are thrown toward the axis of rotation by centrifugal force and lodge in the surface of the bore.

Second possible cause is vibration in the loaded casting machine, resulting in splashing and tumbling of the metal. Remedy for vibration usually is to try reducing the speed slightly. You mention that your present speed is over 800 rpm, but not the exact speed. It might be that you are operating at a considerably higher rate than you think. Satisfactory rates of speed seem to be 800 to 850 rpm.

Third and possibly the likely cause of the rough bore is lack of proper sand condition in the mold. Assuming that the mold is rotating at 850 rpm, the interior surface will be travelling around 900 ft per minute for a 4-in. pipe, and the hot metal falling on the surface will produce a cutting or erosive action. Hence, the sand condition as to physical characteristics and ramming should be such that it will resist cutting or erosion. For example, one firm uses a sand with a green compression strength of 16 psi, permeability 96, flowability 70, AFS grain fineness 57, and moisture slightly less than 5 per cent.

CAN ONE SAND MAKE EVERYTHING?

Yes, IF IT'S

Westonite!

Flexibility!

Fineness? . . . . . 100 AFS
Green Strength? . 10-12 lbs.
Permeability? 55
Moisture? 3.2%

●

GREEN SAND,
DRY SAND,
SKIN-DRIED
All the Same Sand!

18 ounces or 18 pounds or 1800 pounds or 18,000 pounds, —they all look alike to Westonite! Green sand, dry sand, skin-dried, every kind of sand,—you get the advantages of all types in this one chemically coated sand, WESTONITE. Why spread your investment over several or many types of product that you don't need? The savings in this respect are enough to justify your specifying Westonite next time. In addition, this tough, workable sand with the highest flowability known to the industry brings you many other benefits, about which we would like to tell you more.

* * *

Ask for Bulletin F-9

EASTERN CLAY PRODUCTS, INC.
JACKSON, OHIO

DIXIE BOND • BLACK HILLS BENTONITE
REVIVO BOND • REVIVO SUPER BOND
BALANCED REVIVO

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BONDING CLAYS and EXCEPTIONAL FOUNDRY SERVICE

Since 1926

BONDACTOR EQUIPMENT • CUPOLINE REFRACTORY • DURA PRODUCTS

MEN of Industry

FREDERIC W. JACOBS has been named chief metallurgist, Texas Foundries Inc., Lufkin, Tex. Mr. Jacobs was graduated from Case Institute of Technology in 1939 with a degree in metallurgical engineering. He was associated with Lake City Malleable Co., Cleveland, for a year and a half, and then spent 3 years as metallurgical engineer and production manager at its subsidiary, Columbus Malleable Iron Co., Columbus, O. For the past 6½ years he was chief metallurgist and assistant to the manager at Lake City Malleable Inc., Ashtabula, O. Mr. Jacobs is a member of the Controlled Annealing Committee of the Malleable Division, American Foundrymen's Society, and has been a member of its Northeastern Ohio Chapter.

♦ ♦ ♦

Glenn F. Ihrig has been named assistant sales manager, Wellman Bronze & Aluminum Co., Cleveland. A native of New Kensington, Pa., Mr. Ihrig completed high school in Arnold, Pa., and took a number of extension courses at University of Pittsburgh. He has been associated with Wellman Bronze & Aluminum Co. for over 7 years, and has served as sales representative in Indiana, Ohio, Pennsylvania and New York.

♦ ♦ ♦

A. J. Grindle has been appointed consulting metallurgical engineer, Whiting Corp., Harvey, Ill., succeeding the late A. W. Gregg. Mr. Grindle was manager of the foundry equipment department at Whiting for two years and in 1947 became vice president in charge of foundry equipment sales. He originated the first successful system for melting malleable iron with pulverized coal and was manager of the pulverized coal department, Grindle Fuel Equipment Co., Harvey, Ill., when it became a subsidiary of Whiting Corp. In his new position Mr. Grindle will work closely with the general sales force on problems involving product application and foundry mechanization.

♦ ♦ ♦

Daniel E. Krause, who has been named chairman of the Central Ohio Chapter of the AFS for the year 1950-51, is executive director of the Gray Iron Research Institute, Columbus, O. Mr. Krause was graduated from University of Wisconsin and was associated with Battelle Memorial Institute, Columbus, O., for 15 years. In 1947 he was appointed executive director of the institute to supervise the organization's plant service work and publications and have general charge of administration of its research projects. An active member of the American Foundrymen's Society he has served as a member of its Committee on Chill Test and has been secretary of the Central Ohio Chapter for several years.

♦ ♦ ♦

Raymond M. Thayer has been appointed plant superintendent, United States Graphite Co., Saginaw, Mich., succeeding the late Albert J. Lent. Mr. Thayer joined the company in 1926 following graduation from Michigan State College. He has been chief inspector since 1942.

♦ ♦ ♦

Joseph A. Blizman, for the past 7 years supervisor of production, Herman Pneumatic Machine Co., Pittsburgh, has been appointed sales and service engineer, with headquarters in Evans City, Pa. His territory will include Ohio, West Virginia, western New York, western Pennsylvania and central Canada. Mr. Blizman joined the engineering department of the company 20 years ago.

♦ ♦ ♦

Harry T. Graham has been appointed general sales manager, General Refractories Co., Philadelphia, succeeding **S. S. Furst** who has been named assistant to the vice president in charge of sales. Mr. Graham, who joined the company in 1937, was field salesman in the Chicago, Philadelphia and Pittsburgh district offices until last year when he became assistant general sales manager.

♦ ♦ ♦

Harlow F. St. Pierre, formerly assistant sales manager, Hunt-Spiller Mfg. Corp., Boston, has been named manager of the industrial castings sales division.

♦ ♦ ♦

Marcel Ballay recently was presented the Gold Medal of the Association Technique de Fonderie of France, in recognition of his services as immediate past president of the association. The medal was presented

(*Continued on page* 122)

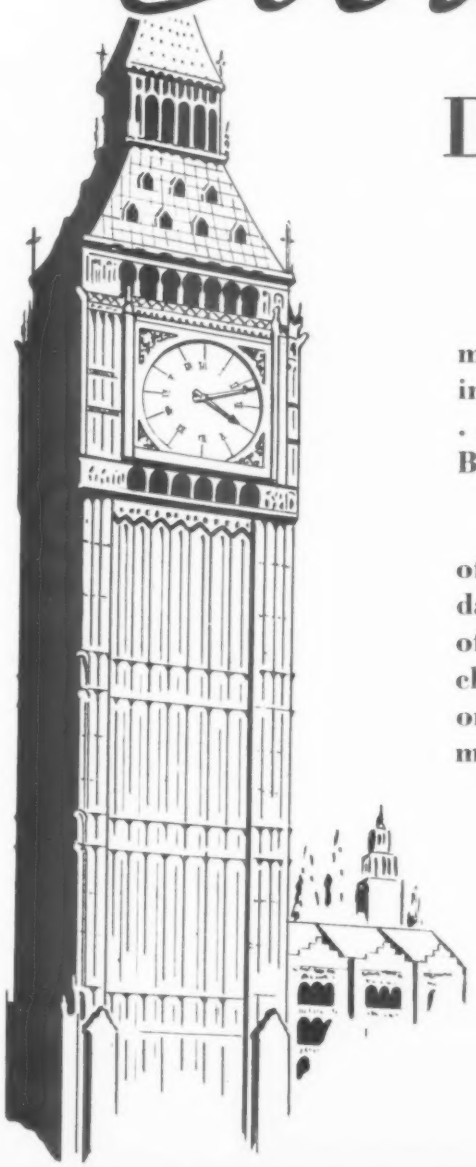
FREDERIC W. JACOBS

GLENN F. IHRIG

A. J. GRINDLE

DANIEL E. KRAUSE

Every day DEPENDABILITY



"Big Ben"—the 13½-ton clock in the Westminster clock tower of the Houses of Parliament in London—has been the symbol of every hour . . . every day . . . dependability throughout Great Britain since it was installed in 1858.

For 68 years, Woodward has been the byword of dependability in the foundry trade. The every day dependability of Woodward Iron is the result of many factors: Good equipment, careful checks, air-conditioning of the blast, and a base ore burden from the same ore body, owned and mined by Woodward. Add to this the fact that Woodward—a strictly independent merchant iron producer—controls every phase of its operations and moulds its own policies as well as its uniform pig iron.

As the British look to "Big Ben" for right timing, so the foundry trade looks to Woodward for merchant iron made right at all times and under all conditions.

WOODWARD IRON COMPANY

WOODWARD, ALABAMA

Independent Since 1882

GENERAL SALES OFFICE: 1515 First National Building • Birmingham, Alabama • Phone 54-1667

MEN of Industry

(*Continued from page* 120)

by **M. Waeles,** who succeeds Mr. Ballay as president. Present at the meeting were M. Olivier, president, General Syndicate of French Founders; M. Ricard, senior vice president of the Syndicate; A. Le Thomas, general director, Centre Technique de la Fonderie; M. Petit, director of the Foundrymen's Syndicate; and Prof. Chevenard, honorary president, French Technical Association.

♦ ♦ ♦

R. W. Tompkins, until recently manager of Chicago and midwestern operations, United States Plywood Corp., New York, has been appointed general sales manager, U. S. Reduction Co., East Chicago, Ind. Mr. Tompkins was graduated from University of Illinois with a degree in chemical engineering. Following a period as engineer with Inland Steel Co., Chicago, he was engaged in sales work with U. S. Gypsum Co., and Lehon Co., Chicago, and Certain-teed Products Corp., Ardmore, Pa.

♦ ♦ ♦

Richard A. Green has been appointed sales representative in the northern Ohio area for Eastern Clay Products Inc., Jackson, O. Following graduation from University of Detroit in 1945 Mr. Green was associated with Frederic B. Stevens Inc., Detroit, until 1948, when he joined Harry W. Dietert Co. there, as a sales engineer.

♦ ♦ ♦

Charles H. Gallaway, sales manager, Safety Products Division, American Optical Co., Southbridge, Mass., has been elected president, Industrial Safety Equipment Association, New York, succeeding **Lawrence E. Dickson,** president, Standard Safety Equipment Co., Chicago. **E. L. Wheeler,** Wheeler Protective Apparel Inc., Chicago, succeeds Mr. Gallaway as vice president of the association and **Stewart N. Clarkson,** 420 Lexington Ave., New York, has been reappointed secretary-treasurer.

♦ ♦ ♦

Chester V. Nass, who has been named to succeed the late Alfred W. Gregg as president of the Chicago Chapter of the American Foundrymen's Society for the year 1950-51, is vice president, Pettibone Mulliken Corp., Chicago and vice president of the Beardsley & Piper Division. Mr. Nass, a native of Granville Ferry, Nova Scotia, was graduated from Tufts College in 1923. He was associated with Ohio Brass Co., Mansfield, O., for 5 years, as assistant metallurgist and later, plant metallurgist. In 1928 he joined the Humphreys Mfg. Co., Mansfield, O., resigning the following year to accept the position of brass foundry superintendent, Fairbanks, Morse & Co., Beloit, Wis., where he remained until 1942. At that time he joined Pettibone Mulliken as manager of the foundry division, becoming vice president in 1946.

♦ ♦ ♦

Norman F. Tisdale Jr. has become associated with Molybdenum Corp. of America, Pittsburgh, as a development engineer.

* * *

Walter A. Funk, for the last 6 years foundry superintendent, Reliance Foundry Co., Cincinnati, has retired and will live permanently in Delray Beach, Fla. Prior to joining Reliance Foundry Co., Mr. Funk was associated with Stedman's Foundry & Machine Works, Aurora, Ind., where he served 10 years as foreman and 12 years as foundry superintendent. During World War I he assisted in operation of a foundry in France for the Army. Mr. Funk was a member of the Cincinnati District Chapter of the AFS while residing in Cincinnati.

♦ ♦ ♦

William O. Murphy has been named sales manager of the materials handling equipment division, Union Steel Products Co., Albion, Mich., succeeding **Lawrence F. Emigholz** who has become assistant to the president, Williams Form Engineering, Grand Rapids, Mich. Mr. Murphy was formerly associated with Byrne Doors Inc., Truscon Laboratories and Detroit Edison, all of Detroit.

♦ ♦ ♦

Donald J. Reese has been appointed visiting lecturer of the foundry training program at Massachusetts Institute of Technology. He will cover the fields of cast iron and cupola operation. Mr. Reese, with the Development and Research Division, International Nickel Co., New York, has been an authority in these fields for many years.

♦ ♦ ♦

Hewitt A. Gehres, executive vice president and director of engineering, Cooper-Bessemer Corp., Mt. Vernon, O., was awarded the honorary degree of Doctor of Science, at recent commencement ceremonies of Grove City College, Grove City, Pa., in recognition of significant contributions to the engine-building industry in advancement and broad application of large compressors, gas and diesel engines and allied machinery.

♦ ♦ ♦

Andrew E. St. John, for the past 25 years associated with Federated Metals Division, American Smelting & Refining Co., New York, has joined the sales and engineering staff, Barth Smelting Corp., Newark, N. J. Mr. St. John, a graduate of Case Institute of Technology, has been active in all

(*Concluded on page* 124)

R. W. TOMPKINS

RICHARD A. GREEN

CHARLES H. GALLAWAY

CHESTER V. NASS

Bay State Proudly Hails....

AMERICA'S NEWEST, FINEST, FASTEST, LUXURY LINER . . .

"Independence"

Launched June 3, 1950
Bethlehem Steel Co.
(Shipbuilding Division)
Quincy, Massachusetts
Maiden Voyage Feb., 1951

Courtesy American Export Lines · Inc·

BAYFLEX® abrasive products played an important part in the building of this super liner . . . removal of rust and scale from steel plates before fabrication . . . grinding and finishing of welds . . . cutting metal parts such as cabinet doors, angles, joints . . . grinding stainless steel sinks . . . and innumerable other metal grinding, cutting and finishing jobs.

BAYFLEX® abrasive products might be the answer to <u>your</u> grinding problems. Write us for a free demonstration.

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GRINDING WHEEL INSTITUTE MEMBER

Top Performance Consistently Duplicated

MEN of Industry

(*Concluded from page* 122)

phases of the secondary smelting industry including the metallurgy, manufacture, service engineering and sales promotion of products, and is the author of many technical booklets on nonferrous alloys.

♦ ♦ ♦

Michael Warchol, Atlas Foundry Co., Detroit, has been elected secretary of the Detroit Chapter of the AFS, succeeding **Julian Phelps** who has moved to Buffalo. **J. D. Schmieg,** Schmieg Industries Inc., and **Alexander A. Andrews,** Pontiac Motor Division, have been elected to fill vacancies on the board of directors. **Jess Toth,** secretary and a director of Harry W. Dietert Co., Detroit, is chairman of the chapter.

♦ ♦ ♦

Andrew Liston, manager, hydraulic turbine and marine products department, Baldwin Locomotive Works, Philadelphia, has been put in charge of sales of all foundries products. **M. L. Hall,** formerly manager, testing equipment sales, has been appointed manager, testing equipment department. **George F. Walsh,** formerly sales promotion manager, testing equipment department, has been named sales promotion manager of all product groups.

♦ ♦ ♦

Charles Fuerst has been appointed assistant foundry division superintendent, Falk Corp., Milwaukee. Mr. Fuerst has been with the company 26 years. **Joseph Kutsch** has been named methods engineer in charge of the newly formed methods department in the machine shop division.

♦ ♦ ♦

J. William Schaeffer has been named head of the standards section, Hunt-Spiller Mfg. Corp., Boston. Mr. Schaeffer, who joined the company in 1936, spent four years as an apprentice coremaker. Since returning from Navy service he has engaged in timestudy and production standards work for the foundry and finished materials divisions.

♦ ♦ ♦

Sterling N. Farmer, Sand Products Corp., Cleveland, has been elected president of the National Industrial Sand Association. Other officers are: Vice president, **C. M. Hardy,** Hougland & Hardy Inc., Evansville, Ind.; treasurer, **Clarence Wolf,** New Jersey Silica Co., Millville, N. J.; executive secretary, **Vincent P. Ahearn,** Washington. **Stanton Walker** is consulting engineer.

♦ ♦ ♦

Melvin L. Bunting has been appointed a technical service engineer, Acheson Colloids Corp., Port Huron, Mich., where his duties will include engineering assistance and new applications research. Mr. Bunting, a graduate of Michigan College of Mining and Technology, was previously associated with the Combined Metals Reduction Co., Salt Lake City, Utah, and more recently with U. S. Gypsum Co., Detroit, in the production and quality control department.

♦ ♦ ♦

E. Dale Trout, assistant to the vice president, General Electric X-Ray Corp., Milwaukee, recently was awarded an honorary doctor's degree from his alma mater, Franklin College, Franklin, Ind., in recognition of his major contributions to science. Mr. Trout, who was graduated from the college in 1922, is an internationally recognized authority in the fields of medical and industrial x-ray, and in radiation measurement.

♦ ♦ ♦

Chester Bland, president, Ohio Electric Mfg. Co., Cleveland, and president, H. P. Townsend Mfg. Co., Hartford, Conn., has been named a director of Leland Electric Co., Dayton, O.

♦ ♦ ♦

Francis I. Taylor Jr. has been appointed a New England representative for the industrial castings sales division, Hunt-Spiller Mfg. Corp., Boston. Until recently Mr. Taylor was associated with Teiner Engineering Corp., Boston, and from 1944-46 was an inspector of machinery and engineering materials for the Navy.

♦ ♦ ♦

Merritt W. Storey has joined the sales force of the building material department, Arkansas Foundry Co., Little Rock, Ark. Mr. Storey, who has had many years of experience in the building material business, was associated with Pittsburgh Plate Glass Co., Pittsburgh, for 12 years.

♦ ♦ ♦

B. A. Dollens has been named general manager of the Electro-Motive Division, General Motors Corp., LaGrange, Ill., succeeding **Cyrus R. Osborn,** who has been put in charge of all engine activities with headquarters in Detroit. Mr. Dollens, who has also been elected a vice president of the corporation, joined the company in 1925 following graduation from Purdue University. Advancing through positions of superintendent of various plants, he became general manager of the Saginaw Malleable Iron Division, Saginaw, Mich., in 1945, and assistant general manager of the Electro-Motive Division at LaGrange, Ill., a year later.

♦ ♦ ♦

Alexander S. Wright has been appointed sales representative in Massachusetts, Rhode Island, New Hampshire, Vermont and Maine for Springfield Facing Co., Willimansett, Mass. Mr. Wright, following graduation from Northeastern College, was metallurgist, Hunt-Spiller Mfg. Corp., Boston, for 23 years and for 2½ years held a similar position with Standard Foundry Co., Worcester, Mass.

♦ ♦ ♦

Arthur B. Tesmen has been appointed sales engineer, Tempil Corp., New York. Mr. Tesmen was graduated from University of Michigan and did postgraduate work in metallurgy at Lehigh University. Until recently he was associated with North American Philips Co., New York, and prior to that with Crucible Steel Co. of America, New York and the Industrial Laboratory, Philadelphia Navy Yard.

♦ ♦ ♦

Robert E. Ward has been appointed manager and **Ralph D. Ferguson,** sales manager, Eclipse-Pioneer Division foundry, Bendix Aviation Corp., Teterboro, N. J., Mr. Ward was formerly director of metallurgy for the division, and Mr. Ferguson was assistant manager of the foundry.

♦ ♦ ♦

Jack W. Giddens, until recently associated with the International Harvester Co., Indianapolis, has joined Wells Mfg. Co., Skokie, Ill. Mr. Giddens was vice chairman of the Central Indiana Chapter of the AFS last year.

♦ ♦ ♦

Henry C. Winte has been appointed superintendent of the Stoughton, Wis., foundry, Garden City Foundry Co., Chicago. Until recently Mr. Winte was foundry superintendent, Plant 1, Motor Castings Co., Milwaukee. Prior to that he was associated with Worthington Pump & Machinery Corp., Buffalo, for 6 years.

♦ ♦ ♦

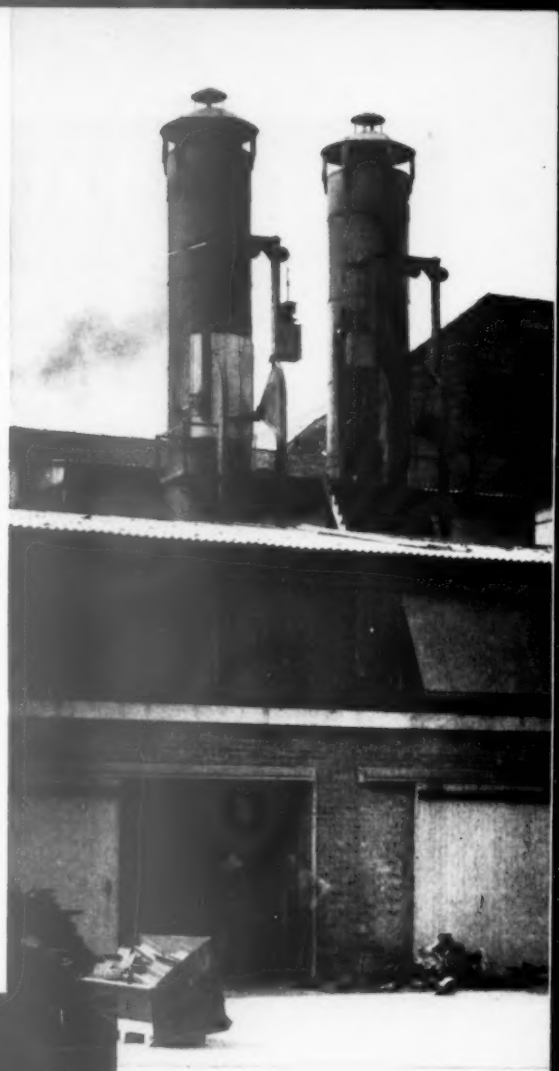
William H. Caldwell, secretary and assistant treasurer, Northern Malleable Iron Co., St. Paul, has been elected to membership in the controllers Institute of America.

Smaller Foundries, too

ARE BENEFITING FROM WHITING-ENGINEERED MECHANICAL CHARGING

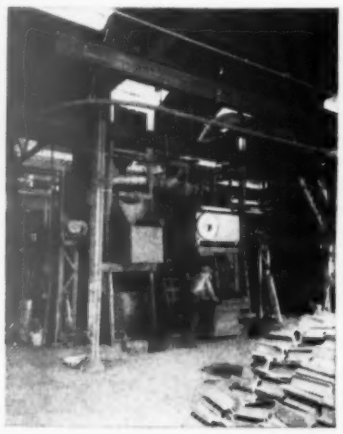
TODAY, mechanical charging is reducing costs and improving working conditions in scores of smaller foundries —plants which pour no more than 5 to 25 tons per day. No need to envy the "big fellows" . . . Whiting engineers will gladly show how YOU can use mechanization economically and profitably.

Whiting Charging Installations begin with simple skip hoists, bucket loaders, and other inexpensive equipment that small foundries can use to advantage. No operation is too small to receive our careful attention. Why not ask for our suggestions?



These two Whiting #4 Cupolas are served by side-dump skip hoist chargers

Bottom-dump scale-lorry suspended from monorail . . . shown in material yard



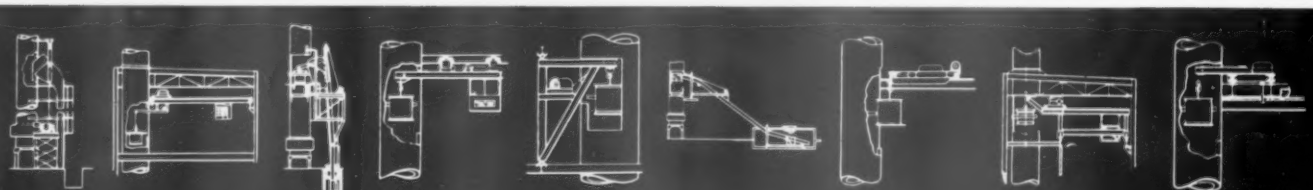
Here the monorail lorry discharges into the skip hoist charging bucket

WHITING CORPORATION

15607 Lathrop Ave., Harvey, Illinois

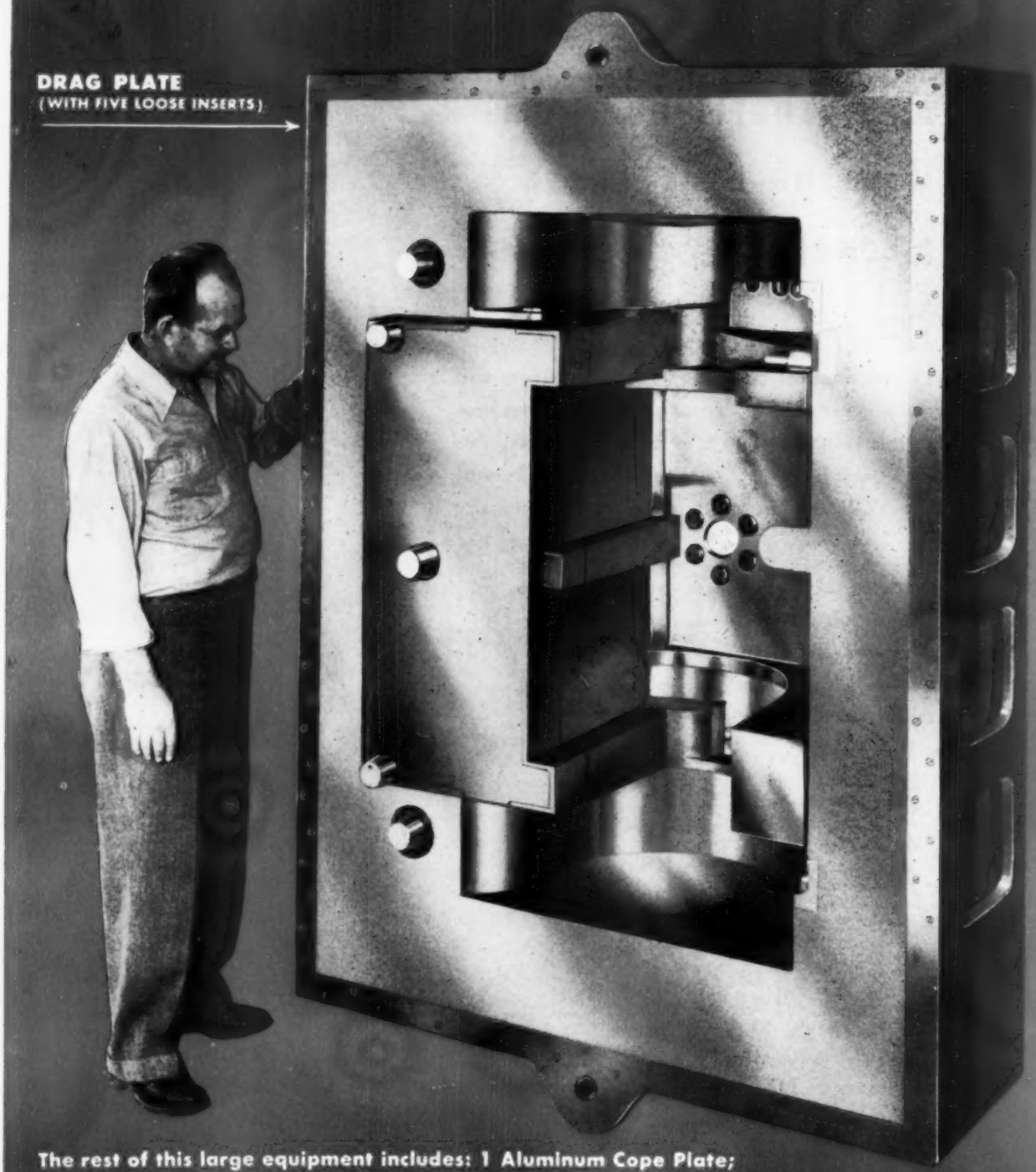
Offices in Chicago, Cincinnati, Detroit, Los Angeles, New York, Philadelphia, Pittsburgh, and St. Louis. Agents in other principal cities. Canadian Subsidiary: Whiting Corporation (Canada) Ltd., Toronto, Ontario. Export Department: 30 Church St., New York 7, N. Y.

WHITING MAKES ALL TYPES OF MECHANICAL CHARGERS



SIDE-DUMP SKIP | UNDERSLUNG CRANE | "VM" SKIP | MONORAIL CRANE | JIB CRANE | SWIVEL SKIP | HORSESHOE TROLLEY | GANTRY CRANE | OVERHUNG CRANE

BUFFALO PATTERN WORKS — Since 1893



The rest of this large equipment includes: 1 Aluminum Cope Plate; 24 Aluminum, steel-faced Core Boxes with 53 loose pieces; 6 sets of Aluminum Ram-up Core Driers in 108 pieces; 9 Aluminum, steel-faced Core Rubbing Fixtures; 1 Aluminum Core Assembly & Pasting Gauge; 1 Aluminum Core Setting Gauge; 1 complete set of Cast Iron Chills.

There were over 4 Tons of Aluminum used in this Equipment.

OUR ESTIMATING DEPARTMENT WELCOMES YOUR INQUIRIES...

BUFFALO PATTERN WORKS

• DESIGNERS AND MANUFACTURERS OF PATTERN EQUIPMENT FOR OVER HALF A CENTURY

830 HERTEL AVE. • BUFFALO 16, N. Y., U. S. A. • PHONE RI. 3512

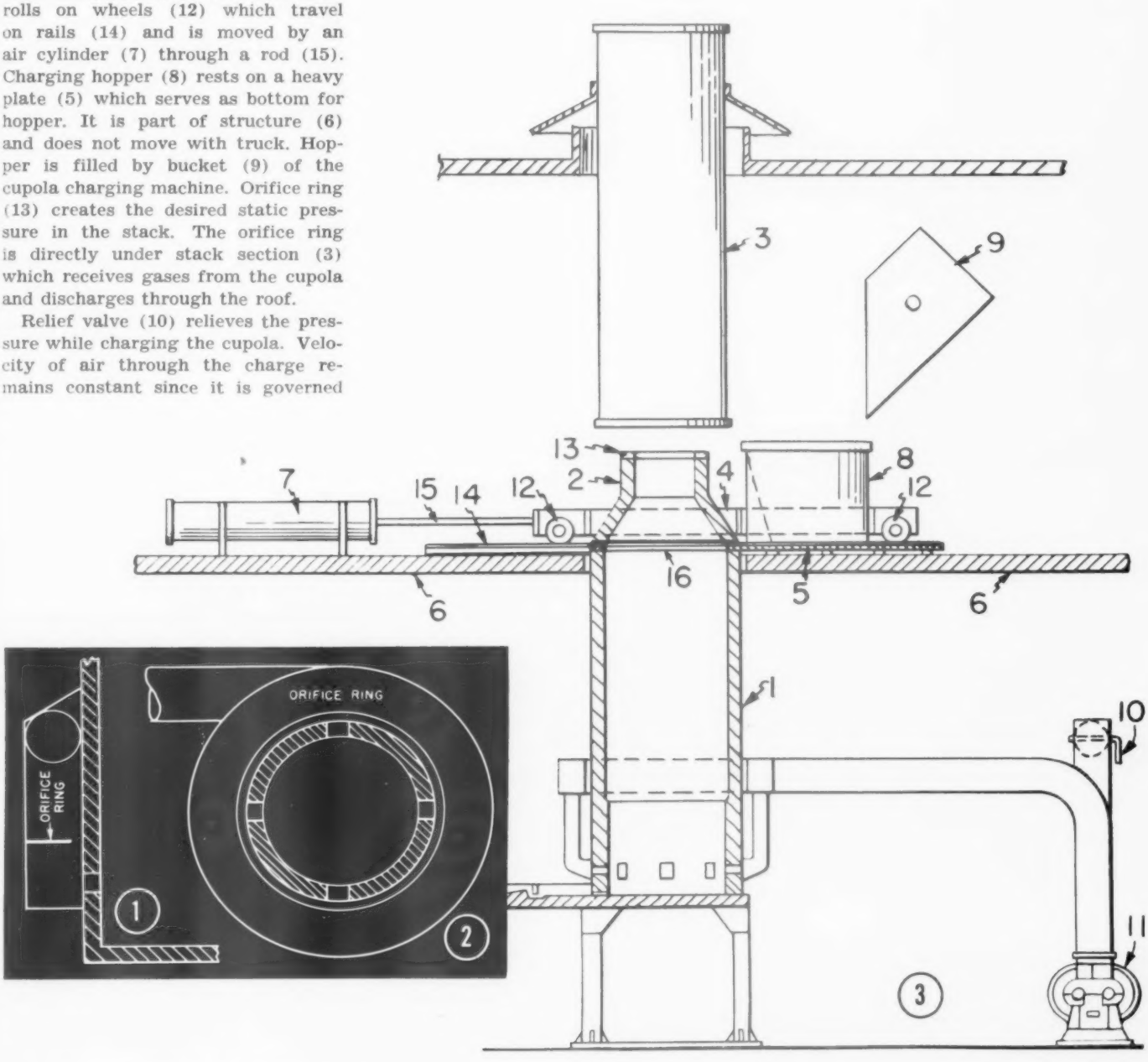
The Pressurized Cupola

IN AN attempt to solve the problem of uniform distribution of air through the cupola charge, Ernest F. Fisher, Glen Rock, Pa., designed a windbox equipped with a circular orifice ring (Figs. 1 and 2) which divided the box into two chambers. The upper chamber had the customary tangential inlet, and the lower chamber connected with the tuyeres. In theory the orifice ring provided uniform distribution of air to the tuyeres but did not control conditions beyond the tuyeres. The orifice was on the wrong side of the tuyeres. This experience led to the type of pressurized construction shown in Fig. 3.

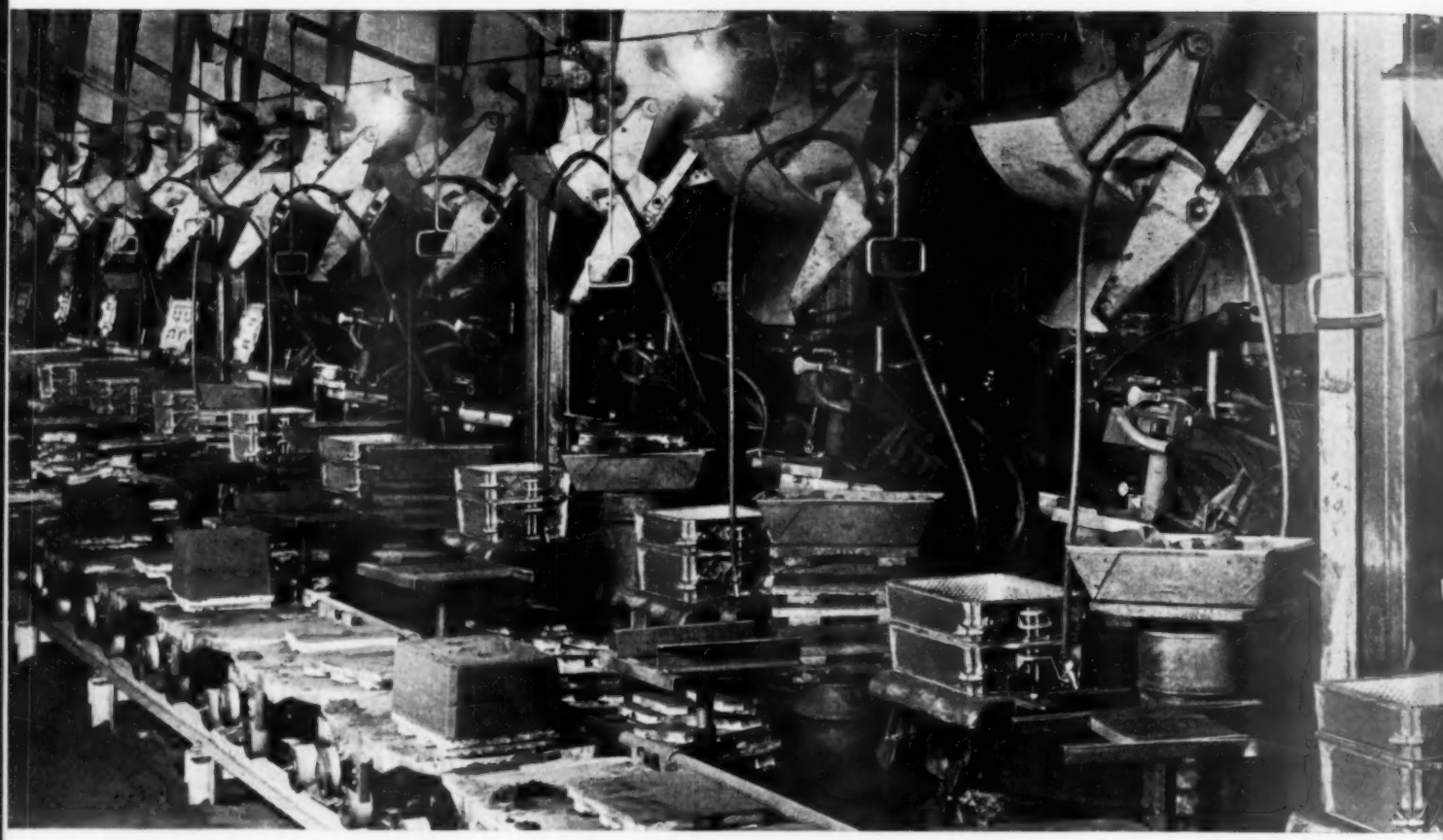
This stack is maintained under constant static pressure. Stack is surmounted by a bell-shaped section (2) and removable orifice ring (13). Section (2) is mounted on truck (4) with charging hopper (8). Truck (4) rolls on wheels (12) which travel on rails (14) and is moved by an air cylinder (7) through a rod (15). Charging hopper (8) rests on a heavy plate (5) which serves as bottom for hopper. It is part of structure (6) and does not move with truck. Hopper is filled by bucket (9) of the cupola charging machine. Orifice ring (13) creates the desired static pressure in the stack. The orifice ring is directly under stack section (3) which receives gases from the cupola and discharges through the roof.

Relief valve (10) relieves the pressure while charging the cupola. Velocity of air through the charge remains constant since it is governed by the orifice ring and the volume of air handled. Operation may be likened to an air receiver filled with air at a constant pressure while the air is discharged through a calibrated orifice at constant velocity. Construction and operation produce uniform flow of air through all the voids in the charge material. The only operating variable is the air volume required and that may be controlled by a metered air supply.

These benefits are claimed for the pressurized cupola: Operation less dependent on coke size; ease of supplying correct volume of air; better combustion; higher metal temperature; uniform lining erosion; greater air density to promote efficient combustion, less smoke and fly ash.



OSBORN SQUEEZERS

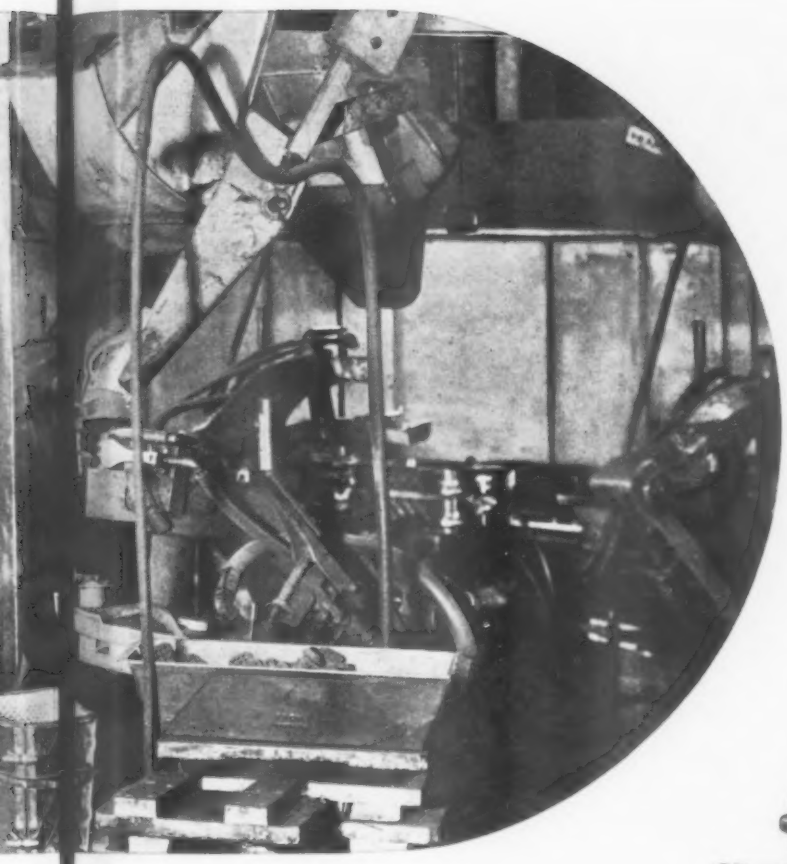


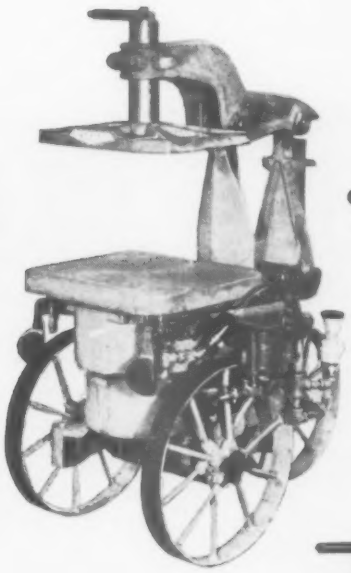
Portable and stationary models, cantilever or post type heads, squeeze pistons 10 to 18 inch diameters, wide range of table sizes—you'll find the one unit in the Osborn line of Jolt Squeezers that best meets your specific needs.

And, whatever your choice, you're assured the accuracy, economy and ease of operation that have made Osborn Jolt Squeezers the production standard of the foundry industry.

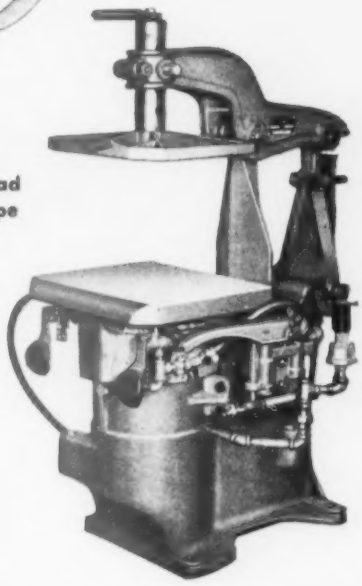
THE OSBORN MANUFACTURING COMPANY
5401 Hamilton Avenue Cleveland, Ohio

A SIZE AND TYPE FOR EVERY PRODUCTION NEED....

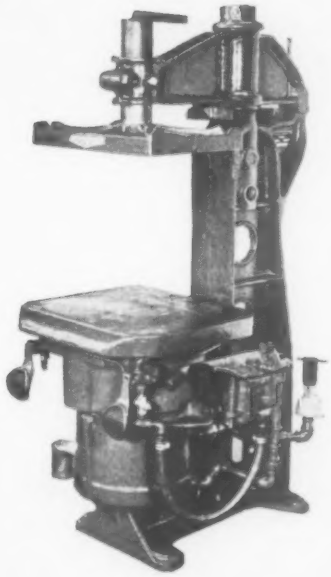




Cantilever Head
Portable Type



Cantilever Head
Stationary Type



Stationary
Post Type

STANDARD EQUIPMENT

Osborn Jolt Squeezers are furnished as standard equipment, complete with Closing and Riddle Racks, Vibrator with chrome plated bore, Blow Gun and Automatic Squeeze Pressure Release Valve for automatically maintaining a predetermined squeeze pressure on each mould.

OSBORN

MOULDING MACHINES **CORE BLOWING MACHINES**

MEMBER
MANUFACTURERS ASSOCIATION, INC.
FOUNDRY EQUIPMENT

MAN·TO·MAN on the Molder's Bench

"A Trip Through the Lee Hobby Foundry"

By RALPH L. LEE

(Photos by John E. Linabury)

I GOT to figuring the other day, "Here I go visiting one foundry after another all over the country, listening while the bosses or owners put their best foot forward, gild the lily a bit, show me how big they have grown and the rabbits they have pulled out of hats, while the LEE FOUNDRIES hides its light under the bushel, so to speak. So I thought it was about time to get set up for taking more people through our plant. In this day and age where public relations seems to be getting more and more attention, it struck me that the LEE FOUNDRIES can't afford to be dragging along on the tail end of the procession.

The author poses with Mrs. Lee

So if you will follow me I'll take you through the plant. Now before we start I'd like to explain what might seem to be bad manners; instead of my waiting at each door for you to go in first, I'm going to go in first, because when you get in you won't know where to go next and I do. I know from a lot of visiting experience this will save time.

I'd suggest that we all stop here for a moment (Fig. 1) because from here we can get the best view of the outside of the plant. The white thing sticking up through the roof of the lean-to over there is the cupola stack. I notice you are all looking at all the glass over there to the right; it looks like a greenhouse and that's what it is. It's Mother's (that's my home superintendent, my vice-president in charge). A number of clowns who have gone through the plant asked me whether we put vases of flowers in each department to sort of stimulate an aesthetic sense among our employees. The only reason the greenhouse is there is that Mother wanted it there and besides I could save one wall when I built it.

Now just before we go through the main entrance (Fig. 2) I'd like to have you notice the sign over the door, LEE HOBBY FOUNDRY—nothing showy, but I sorto' felt that a little class out in front would give visitors a suggestion of quality work. The cast iron tablet over there to the left is too small to read from here; it says "Enjoy yourself, it's later than you think."

If you'll stand back over here (Fig. 3) we'll be able to see the pattern shop better; in fact, about half of you had better wait on the outside or nobody will be able to see anything. That's the table saw, left center, not very big, but it serves the purpose. You can't see the jigsaw, it's behind the stove which you also can't see. Belt and disk sander back in the corner and the new drill press on the end of the bench. Our pattern maker, Ralph Lee, is working on the pattern on top of the bench; it's for a pig mold. By the way, he swears by that rotary planer in the drill press.

You'll have to excuse the sawdust

(*Continued on page* 132)

reduced losses

increased production

smoother castings

Ephrata Manufacturing Company
Quality Gray Iron Castings
Machine Work
Ephrata, Pa.

July 11, 1950

National Engineering Co.
549 West Washington Blvd.
Chicago 6, Illinois

attention: Mr. W. G. Pardonner

Gentlemen:

Referring to your letter of June 29 with reference to our Simpson Porto-Muller purchased from you some time ago, wish to advise that we are entirely satisfied with the performance of this equipment.

We are pleased to state that we have been able to reduce our losses on certain castings with the sand prepared by this machine and at the same time increased our production as well as produced smoother castings.

Should we have any problem in connection with this machine, you may be sure that we will contact Mr. Troy on same.

Yours very truly,

EPHRATA MANUFACTURING COMPANY

President

WMB/mgh

...thanks to the SIMPSON *Porto-Muller*

Here is another progressive foundryman that is taking advantage of the time and money-saving features offered with the SIMPSON *Porto-Muller.*

Recently introduced, there are now over one hundred *Porto-Mullers* in service, bringing a new conception of portability, together with the *true* Simpson mulling method.

For the full story on this newest National development, be sure to write for your copy of BULLETIN 492 today.

SIMPSON
Intensive
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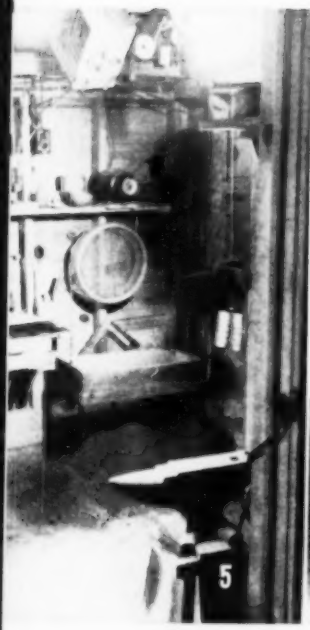
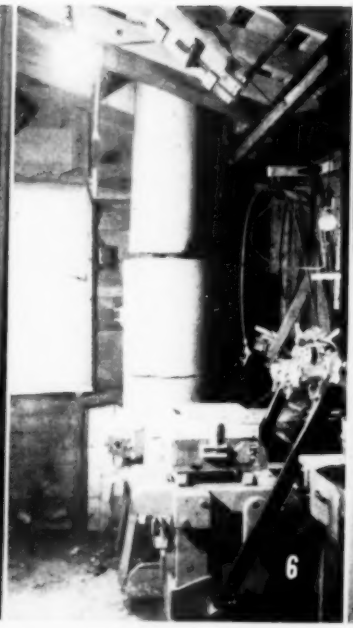
Manufacturers and Selling Agents for Continental European Countries—The George Fischer Steel & Iron Works, Schaffhausen, Switzerland. For the British Possessions, Excluding Canada and Australia—August's Limited, Halifax, England. For Canada—Dominion Engineering Co., Ltd., Montreal, Canada. For Australia and New Zealand—Gibson, Battle & Co., Pty., Ltd., Sydney, Australia





(*Continued from page* 130)

and the shavings on the floor; the pattern-maker's apprentice, Ralph Lee, is quite a problem. While our pattern volume is small—that is, in comparison with some—we get along and we're pretty well equipped and supplied, if I do say it myself. There's a disappearing stairway in the other end of the shop that leads up into the loft where we store our patterns and pattern lumber. You'll notice that we are pretty well crowded, but we don't want to expand until we're darned sure we can keep the place filled.

This is the air-compressor (Fig. 4) as you can see. While it isn't much to look at, it does the trick. I picked it up in the junk yard for a song, minus the fly-wheel. We rebuilt it and had our patternmaker make the wheel out of wood.

Now if you will come this way we will visit the sand conditioning department (Fig. 5) which, by the way, is in charge of Ralph Lee, our chief molder. He takes a lot of pride in the rig for riddling sand. That little motor on the shelf is belted to that pulley back there in the corner, which in turn moves the walking beam on the wall back and forth. One end of the riddle is hooked to it at the bottom and the other end of the riddle is unhooked from the chain and the walking beam and hung up out of the way on the wall. Space is at a premium. We throw two cans of round rocks into the riddle for mulling.

The anvil sticking out in the doorway belongs to the forge department. Our blacksmith, Ralph Lee, is in charge. I'll tell you folks, I don't know what we would do without that blacksmith shop; it pays for itself over and over each year. Instead of putting out a purchase order for everything that comes up, we make it.

While I realize that most molders usually have their tools all mixed up with nails, wire, sprue sticks, boards, empty chewing tobacco sacks and miscellaneous odds and ends, our molder, Ralph Lee, is a freak. We've got to humor him by letting him have his way. Notice that all of his things are hanging up; he even has a counterweight on the air hose.

The cupola section is back in that corner (Fig. 6). Now this cupola is novel in several respects. In the first place, it leans slightly toward the smaller capacity type. She lines to 10 inches. When it was first installed we though we were going to

(*Concluded on page* 134)

latest and finest of the McKee Safety Shut-Off Valves

New SERIES "LT" McKee Eclipse LOCK-TITE *Safety Valve*

Again Eclipse is proud to present one of the most unusual and most important developments that has been made in recent years in the industrial gas field.

Complete and Positive Safety

No longer do you need to be satisfied with one-way safety on your gas-fired installations. The new Series "LT" Lock-Tite Safety Valve makes possible for the first time instantaneous Gas Shut-Off under *any* or *all* unsafe conditions. It is available with electric solenoid, for unsafe flame conditions; or with diaphragm actuators to protect against failure of either low pressure, medium pressure or high pressure gas and air.

These various combinations, to suit the particular requirements of your application, are interchangeable, and can be made without removing the valve from the gas line.

Safe–must be Re-Set Manually

If an unsafe flame failure condition exists, the solenoid valve becomes de-energized, permitting the gas valve to snap shut. The valve then can only be opened or re-set manually and that can be done only after the unsafe condition has been corrected, which offers a double protection!

Simple to Install and Service

All units are supplied with flange connections for ease in servicing. Light alloy materials reduce shipping and handling weight.

Supplied in pipe sizes up to 6" with gas capacities up to 20,000 CFH (based on .5" pressure drop).

Write for Bulletin **M-302**

Representatives in All Principal Cities

Eclipse Fuel Engineering Company
725-9 South Main Street, Rockford, Illinois

McKee Eclipse

(*Concluded from page* 132)

have serious trouble with our melter, who, by the way, is a fellow named Ralph Lee. He registered a very serious grievance. He said, "I don't mind lying flat on my back on the wet sand, slag, coke and the iron which came down with the bottom. I don't mind wrenching my shoulder all out of shape reaching up into that little hole trying to daub mud, but I'm a son of a sea cook if I'm goin' to have gobs of that mud plopping down all over my face and into my eyes; life's too darned short." We had several meetings on this grievance and tried to get him to listen to reason, but we finally ended up by cutting the cupola in half just above the melting zone.

Please step over this way and let me show you (Fig. 7). You see, the upper half of the lower section swings back against the wall on hinges. Now we can get at the patching standing up, also putting in the sand bottom, laying the kindling and even going so far as to adding the first coke. Mr. Lee, the melter, puts a gasket of clay on the top of the lower section before he pushes it back into place. It seems to work out all right.

The bottomless and topless kitchen water tank up there (we bought it for a dollar) connects the lower cupola unit with the stack on the roof. By pulling the handle on the end of that chain, the tank swings out so we can charge the cupola.

You can see the wind box around the lower section, and the tuyere covers with their isinglass peep holes. That's the tap hole underneath and in front, and the slag spout is over there to the right. The blower is in behind and driven by the same motor we use on the Goldberg sand conditioning system, but not from way over there of course. We have to move the motor. We've talked about drying and heating the air, water cooling the shell and tuyeres but haven't gotten around to it. That vise peeping around the corner on the left belongs to the blacksmith.

You, of course, appreciate that in the little time we have, we won't be able to see everything, so let's move to the nonferrous melting department, cleaning department and general storage. Mr. Lee, the melter, is in charge of the melting section of this department. And speaking of melting, this furnace (Fig. 8) you will probably notice has a strong resemblance to a garbage pail and there isn't much wonder, for that's exactly what it was made out of. But, after all, it does the trick, and that's what counts, isn't it? The cover swings around like some of the more high falutin' outfits. There's the little blower in back which, by the way, has been running for the past ten years. We use gas for fuel.

That thing on the wall above the furnace (Fig. 9) is the tumbling mill and is driven by the same motor we use on the riddle and the blower for the cupola. Lower right is the sliding door for the coke bin. You can't see four others like it for the different kinds of sand. The bins, by the way, are on the outside; they can be filled without disturbing production. I am sorry that Mr. Lee, in charge of this department, isn't here; probably doing something else for the moment.

Now if you are not too tired from all this tramping and cramming maybe you'd like to go outside and look at the yards (Fig. 10). Oh, by the way, that's Mr. Lee, in charge of the department we just left, standing over there to the right, and he doesn't seem to be doing anything. Help is such a problem these days.

The sand and coke bins I spoke of are to the left. Immediately to the right in the two large containers (ex-king-sized garbage cans) we keep our supply of fire prevention water; then comes the scrap iron storage piles. The steel scrap is on the extreme left of the storage annex. The permanent ladder you see there is for climbing up on the roof to cover and uncover the cupola stack.

I hope you will forgive our pride in the appearance of our grounds, which, by the way, are in charge of our gardener, Mr. Ralph Lee, who works under the immediate supervision of the vice president in charge (Mother). If interviewed on the subject she is likely to say, "Supervise my eye, it's easier to do the work myself." Anyway most of the credit for appearance should go to her.

Now folks, this is the end of our short trip through the LEE FOUNDRIES. The second Tuesday of every month we have a more extended trip which also includes plant number two, containing the machine shop and laboratory, also cafeteria and showers. The president, Mr. Ralph Lee, and his vice president (Mother) live up over the plant; it's in the basement.

Speaking as your guide, Ralph Lee, the sales manager of the organization, I want to thank you for the courtesy you have shown us by your visit and I do hope you have enjoyed yourselves. A good word from you will be greatly appreciated.

Complete X-ray Service Offered on Rental Basis

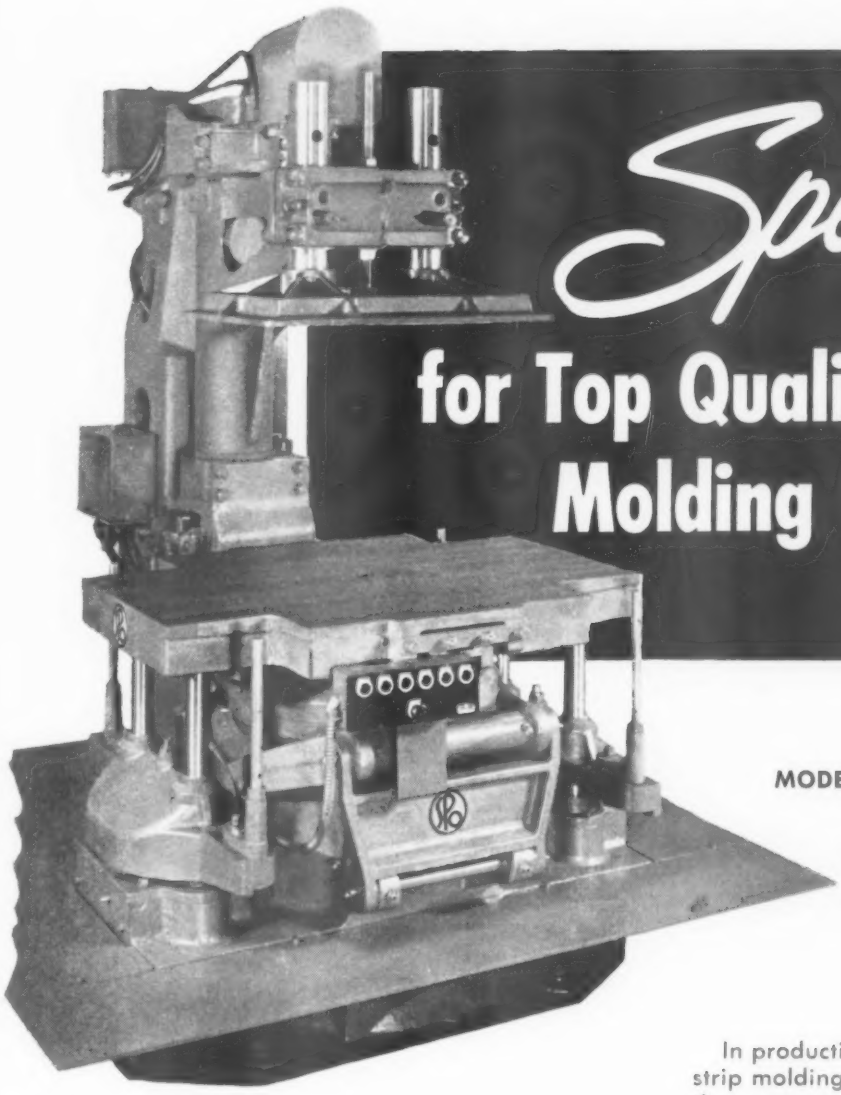
GENERAL Electric X-ray Corp., Dept. DG, 4855 Electric Ave., Milwaukee 14, is offering a "packaged" x-ray service, complete with equipment, maintenance, repair parts, tubes and instruction on a monthly rental charge. The service is designed to enable industry to cut costs, perform research, and control product quality without investing in equipment.

The monthly payment is 100 per cent chargeable against operating expenses. This eliminates the problem of depreciation. The supplier has the responsibility for keeping the apparatus in top operating condition. The plan also eliminates obsolescence risks, since new equipment is available with no investment.

The accompanying photo shows how x-ray reveals flaws in a tractor crankshaft casting.

Repair Welding of Iron Castings

To call attention to advantages of repair welding of castings, American Welding Society, 33 West 39th St., New York 18, has published a 19 page booklet—"Recommended Practices for Salvaging Automotive Gray Iron Castings by Welding." Based on a survey of cast iron welding practices employed throughout the automotive industry, the information should be helpful as a guide in establishing methods of repair for other types of castings. Information is provided on oxy-acetylene and shielded metal-arc welding with and without preheat and stress relief, braze-welding, brazing, soft soldering, metallizing and use of mechanical methods. Typical defects and their repair are illustrated by photographs. Copies of the booklet may be obtained at fifty cents each.



Specify SPO for Top Quality Production Molding Machines

MODEL No. 2222

JOLT–SQUEEZE–STRIP MOLDING MACHINE

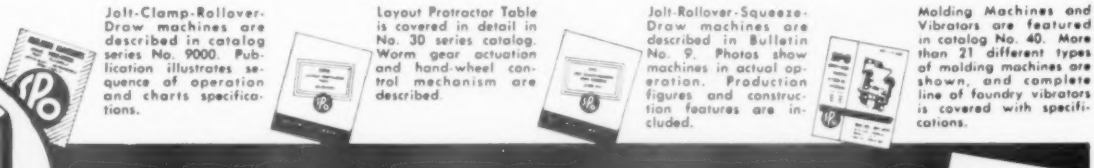
● Today's production requirements are higher than ever—and only SPO has designed its foundry equipment to meet these demands.

CHECK THESE FEATURES: Push Button Control . . . Fully Automatic Cycle . . . Famous SPO inverted jolt mechanism . . . Powerful Squeeze performed by 22" diameter cylinder . . . Dual-mounted squeeze plate . . . Automatically aligned Stripping Mechanism . . . and Automatic Pattern Draw at the desired pre-set speed of operation.

In production, Model No. 2222 jolt-squeeze-strip molding machine is operated entirely by the sequence-arranged push buttons to perform all functions. In addition, jolt-squeeze and vibration operations are timer-controlled to assure production quality of cope and drag molds of uniform standard. Squeeze capacity of this new molding machine is 28,000 pounds and the jolt capacity is 2500 pounds. Model No. 2222 automatic machine has a 36" x 51" table and pattern draw of 12".

From the drawing boards of SPO engineers come the finest and most modern foundry equipment in the world. Step-up your production and reduce your molding costs by SPECIFYING SPO EQUIPMENT THROUGHOUT YOUR FOUNDRY.

Write today for catalog Series No. 200.



Jolt-Clamp-Rollover-Draw machines are described in catalog series No. 9000. Publication illustrates sequence of operation and charts specifications.

Layout Protractor Table is covered in detail in No. 30 series catalog. Worm gear actuation and hand-wheel control mechanism are described.

Jolt-Rollover-Squeeze-Draw machines are described in Bulletin No. 9. Photos show machines in actual operation. Production figures and construction features are included.

Molding Machines and Vibrators are featured in catalog No. 40. More than 21 different types of molding machines are shown, and complete line of foundry vibrators is covered with specifications.

SPO INCORPORATED

6449 GRAND DIVISION AVENUE • CLEVELAND 5, OHIO

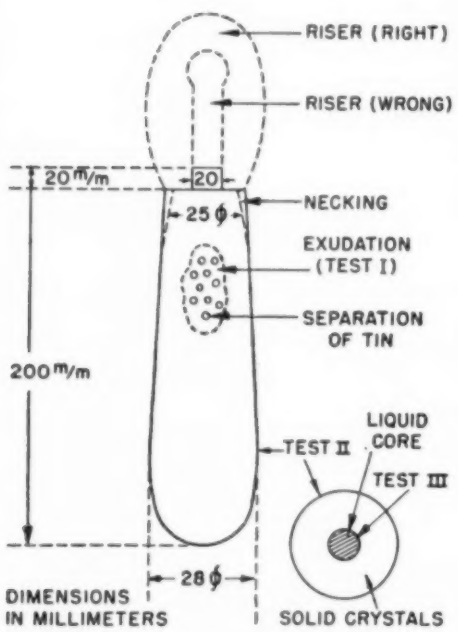
TIN SEGREGATION IN BRONZES

By WALTER CHRETIEN-HORAND
Chretien & Co.
Liestal, Switzerland

IT often is observed that in vertically cast bronze bars, a more or less extensive layer of white, hard metal separates on the upper portion. These bars all show heavy shrinkage defects—imperfect form, necking down or piping. Big risers of large cross section do not show these phenomena. Following is a typical case which was investigated:

A small bolt or pin of the shape indicated in the accompanying illustration had a thick encrustation of white, apparently tin-rich metal on the upper part. It was bronze *A* with about 10 per cent Sn and 90 per cent Cu. Why did this phenomenon occur?

Freezing (solidification) Relationships—Tin-bronze alloys with 7.5 to 22 per cent Sn at a temperature of 792° C. (1458° F) exist as solid crystals with 7.5 per cent Sn, and as a melt with 25.5 per cent Sn. The original homogeneous melt therefore is dissociated at that temperature into two phases of quite different compositions. Since the freezing of round cross sections (complete circles) progresses from outside to inside, the remaining melt is in the interior of the cross section. The solid rim exerts a pressure on the fluid core through contraction and forces, under normal conditions, the excess into the thickening yet fluid riser. With further cooling an adjustment in composition takes place through diffusion so that the cold bronze again exhibits a homogeneous solid solution.



With the small riser the casting showed an exudation of tin-rich compound which was eliminated by the large riser

Should the riser—as in the previous case—be smaller than the cross section of the casting, the fluid core cannot escape to the upper part; it seeks an outlet to another porous place and erupts to the outside. There the remaining melt with 25.5 per cent Sn comes in contact with the cold covering crust, and a diffusion—an adjustment of the tin content—is excluded. Therewith, the phenomenon is clearly illustrated.

An analysis of chips bored from the white encrustation, already mixed with red metal, showed 13.27 per cent Sn (Test I); turnings from the outside Zone II showed 10.75 per cent Sn, and those from the center III showed 10.34 per cent Sn and 89.50 per cent Cu.

Calculation of the Percentage of Melt and Crystals at 792° C (1458° F) for Various Compositions

1. *Bronze with 7.5 per cent Sn and 92.5 per cent Cu*

Quantity, total = a Total tin = $a \cdot 7.5$
Quantity of fluid = x with 25.5 per cent Sn
Quantity of crystals = a − x with 7.5 per cent Sn
Basic Equation:

$$x \cdot 25.5 + (a - x)7.5 = a \cdot 7.5$$
$$18x = o$$
$$x = o$$

That is, at 792° C there is no melt (eutectic) portion

2. *Bronze with 10 per cent Sn*

$$x \cdot 25.5 + (a - x)7.5 = a \cdot 10$$
$$18x = 2.5a$$
$$x = 0.132a$$

Or when a = 100, there is 13.2 per cent melt (eutectic) and 86.8 per cent solid

3. *Bronze with 14 per cent Sn*

$$x \cdot 25.5 + (a - x)7.5 = a \cdot 14$$
$$18x = 6.5a$$
$$x = 0.36a$$

Or when a = 100, there is 36 per cent melt (eutectic) and 64 per cent solid

4. *Bronze with 20 per cent Sn*

$$x \cdot 25.5 + (a - x)7.5 = a \cdot 20$$
$$18x = 12.5a$$
$$x = 0.695a$$

Or when a = 100, there is 69.5 per cent melt (eutectic) and 30.5 per cent solid

These figures explain the great differences which the four preceding bronze types point out practically. It is to be noted that the remaining melt freezes suddenly at 792° C (1458° F). Quick freezing melts always show a finer, denser structure than slowly cooled melts. The 20 per cent Sn bronze therefore is dense and fine; tin-poor bronzes are frequently coarsely crystalline.

Practical Application — Utilize large risers and volumes so that the riser in each case freezes later than the casting. It is self evident that the neck of the riser must be heavier or at least as heavy as the casting. Pouring from the bottom, therefore, is dangerous because the riser contains the relatively coldest metal.

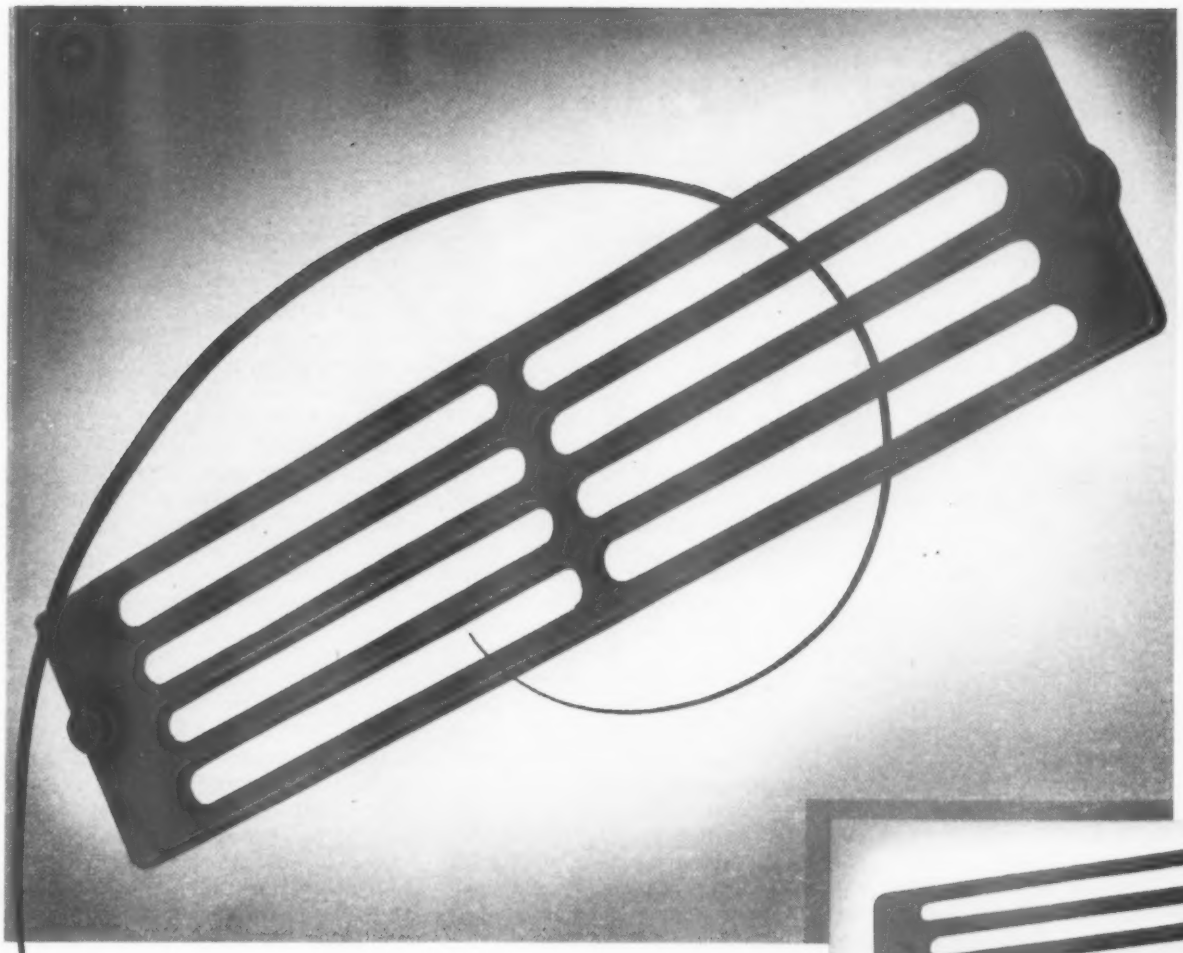
Book Review

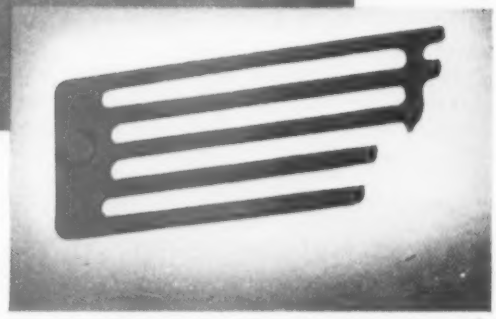
Industrial Inspection Methods, by Leno C. Michelon, 566 pages, 6 x 9½ in. published by Harper & Bros. Price $6.

Since the first edition of this work was published in 1942, a tremendous change has taken place in the philosophy and methods of inspecting industrial products. From a plant level operation, inspection developed during the war to its acceptance by management as an effective co-ordinating tool for top management. Standardization of inspection nomenclature and specifications has been effected, new tools have been designed and statistical methods have been accepted.

The book considers the basic concepts of industrial inspection, dimensional control, testing for physical and mechanical properties, superficial inspection methods, and inspection organization and personnel. Considerable attention is given to statistical methods of quality control.

The author is assistant professor of industrial engineering at Purdue University. While the work is designed primarily for use as a text in the field of engineering education, it also will be valuable in training programs within industry, and for individual study.





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Around THE COUNTRY

CLEVELAND—Tightness in raw material supplies is preventing district foundries from taking full advantage of the current brisk demand for castings. Sorest spot is coke. Aggravating the fuel scarcity have been strikes at ovens of two producers who normally are important sources of coke for local foundries.

Most gray iron jobbing foundries are operating five days a week. Some are running six days and more would follow suit if coke were available. Shipments of beehive coke into the district have been stimulated by the by-product situation. Pig iron is in a less acute position than coke but the supply is not sufficient to accommodate much, if any, increase in consumption. This is reflected in the growing number of inquiries for foreign iron.

Inquiries for foundry equipment have quickened with the rising tempo of foundry operations. Some of the interest is tentative as foundries attempt to determine the ultimate impact of the national emergency on casting demand. Supply of experienced floor and bench molders is limited, a factor which may force some shops to resort to additional equipment to maintain higher production.

* * *

PITTSBURGH—Demand for all types of castings improved substantially during August, notably among those foundries serving the railroad industry. Westinghouse Air Brake Co. operations are up 55 to 60 per cent since earlier this year, while marked increase in output also is noted at Pittsburgh Steel Foundry and Continental Foundry & Machine Co. Steel foundries report sharp upturn in inquiries of direct or indirect military nature, but relatively few orders have been booked. Enamel ware and radiation interests are operating at capacity levels, and near record breaking production is noted among producers of fittings. Activity among steel mill equipment suppliers also is expanding. Pickup among jobbing shops, which had lagged behind captive interests, recorded largest gains last month. One such shop is booked 120 days ahead.

Raw material supply problems have become more acute. The Neville Island, Pa., blast furnace attained normal production last month. However, many foundries have insufficient iron and are resorting to larger proportion of scrap. Some interests have made commitments for foreign iron. Austrian iron is sold out for rest of year. Some iron is available from Belgium but is said to be high in sulphur. Recent commitments have reportedly been for Swedish malleable iron.

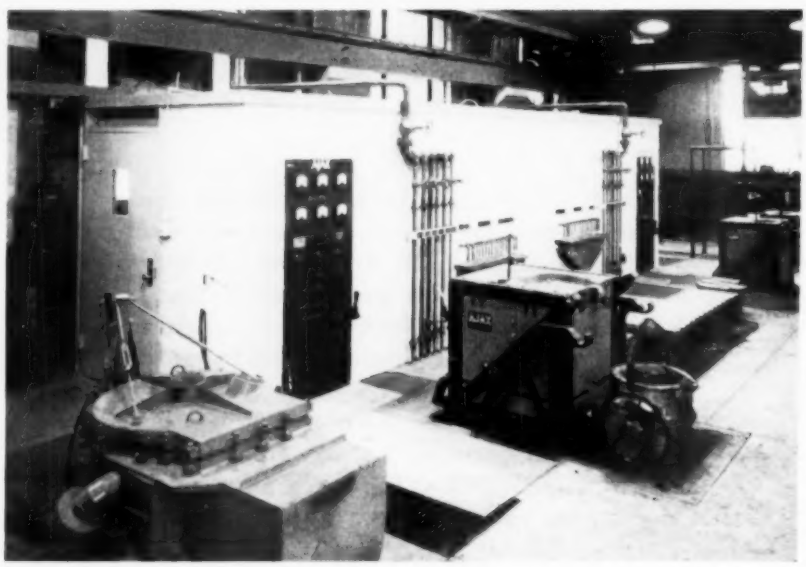
Sterling Steel Foundry Co. is again active under management of Rochez Bros. as Specialty Steel Products Inc. During 1948 the two small open hearths at this foundry were enlarged to 35-ton units and changed over to basic lining for production of ingots. One of these furnaces has been reverted to acid lining. . . . Fort Pitt Malleable Iron Co., idle since Mar. 31, will remain so until surveys and engineering studies are completed, according to H. L. Berkman, president, Steel Trading Corp., the new owner. . . . National Radiator Co., Johnstown, Pa., is moving its sheet metal operations into a $1 million plant near Altoona, Pa., and soon expects to augment plastic metals operations at Johnstown. Company's New Castle, Pa., foundry is establishing new production records as result of widespread modernization program completed some time ago. . . . Westinghouse Electric Corp.'s Trafford foundry commenced producing nodular iron last month under a license arrangement with International Nickel Co.

* * *

CHICAGO—Labor Day will find foundrymen busier than they have been for months. Speed with which demand for castings has improved caught some shops with inventories of sand and other materials too low. As a result suppliers are taking orders larger than anticipated. Pig iron continues a choke point in many shops' operation and good cast scrap also is hard to find. Careful observers now point out there is little excuse for foundries to be unprofitable, but buyers are still trying to drive hard bargains.

Very little of the upsurge in foundry business is traceable to war. A

(*Concluded on page* 140)



IMPROVEMENTS: National Bureau of Standards, Division of Metallurgy, Washington, now has four Ajax high-frequency induction furnaces in the foundry: A 650-lb and a 300-lb tilting furnace, a 200-lb lift coil furnace and a 100-lb vacuum furnace. Two 250-kw generators, permitting two furnaces to be operated simultaneously and independently, replace a single generator previously used. New lighting, a four-fan ventilation system, and two new sets of capacitors, located in a separate, fireproof, dustproof room, have been added. Addition of an overhead monorail system and better arrangement of equipment are planned

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NASHVILLE, TENNESSEE

(*Concluded from page* 138)

lot of it, however, stems from fear that business-as-usual will soon be out the window. Believing that the economy will take on a semimilitary complexion, many casting users are trying to build inventories that will permit them to make their usual products for a time after allocations on certain basic materials are established.

As a result of the pickup, a number of small gray iron shops in outlying areas of Illinois and Wisconsin have resumed operations, and a fairly sizable foundry in lower Michigan is again pouring iron.

Especially noteworthy to malleable shops is the far-reaching freight car procurement program. A net increase of 122,000 units to bring and hold the fleet to 1,850,000 cars is planned, this meaning an output of about 10,000 new cars a month for two to three years. Aside from this and the castings involved in military truck orders in the area, greater war preparedness is giving a tremendous shot in the collective arms of machine tool and other heavy equipment builders, who now are much better customers for castings than they have been.

Capitalizing on the advantages in certain applications of combinations of castings and wrought metal, Continental Foundry & Machine Co. recently opened a weldment division at East Chicago, Ind. The division in no way interferes with Continental's output of castings and occupies the former cast armor plant the company operated for the government during World War II.

* * *

NEW YORK — Ferrous foundry operations to date reflect little defense work. Some orders have been placed for bomb noses and there has been some buying of machinery castings of significant character; however, recent improvement in demand has come principally from producers of peacetime products who are anxious to build up inventories before emergency requirements take greater hold. Most gray iron foundries are operating on a normal daily melt of five days a week. But the trend continues upward

Nonferrous foundries are generally active and prices are showing strength as a result of higher markets in some metals and alloys. Ferrous foundries report a stronger trend in scrap and pig iron. The Swedeland, Pa., furnace has advanced prices $2 a ton, and there is a definitely higher market in imported iron, which district foundries are being forced to turn to in somewhat greater measure because of growing stringency in domestic material.

* * *

PHILADELPHIA — District operations are being stepped up appreciably. Steel casting output is at least 25 per cent heavier than a month ago, due mainly to tooling requirements and efforts of consumers to build up inventories of rough castings.

Gray iron foundries are operating on an average of five days a week, and although the daily melt in all cases has not been fully expanded, production generally may be regarded as about normal. Pipe foundries and certain sanitary casting plants are actually working in excess of normal and have backlogs which assure a high rate of output for some weeks to come; also some textile machinery casting producers. Nonferrous foundries are busy, although feeling the pinch of some raw materials, especially nickel. Coke supply has been adequate to date, but indications point to stringency this fall. The Swedeland, Pa., producer of pig iron advanced prices $2 a ton, effective Aug. 1.

The Budd Co. has started operations at its new plant at Red Lion. When in full production the plant will have a melt of about 20 tons of brake drum castings an hour.

Meetings of Interest to Foundrymen

Sept. 13-16—National Association of Foremen, annual convention, Statler Hotel, Buffalo

Sept. 22—Malleable Founders' Society, general meeting, Hotel Cleveland, Cleveland

Sept. 25-26—Steel Founders' Society of America, fall meeting, The Homestead, Hot Springs, Va.

Sept. 26-29—Association of Iron & Steel Engineers, technical meeting and exposition, Public Auditorium, Cleveland

Sept. 28-30—All Canadian Foundry Conference, sponsored by Eastern Canada and Ontario Chapters of AFS, Royal Connaught, Hamilton, Ont.

Oct. 5-6—Texas Regional Foundry Conference, sponsored by Texas Chapter and Texas A. & M. Student Chapters of AFS, Plaza Hotel, San Antonio, Tex.

Oct. 12-14—Foundry Equipment Manufacturers Association, annual meeting, Greenbrier Hotel, White Sulphur Springs, W. Va.

Oct. 12-13—Gray Iron Founders' Society, annual meeting, Netherland Plaza Hotel, Cincinnati.

Oct. 13-14—Northwest Regional Foundry Conference, sponsored by Washington, British Columbia, Oregon Chapters and Oregon State College Student Chapter of AFS, Gowman Hotel, Seattle

Oct. 13-15—Non-Ferrous Founders' Society, annual meeting, Hotel Statler, Boston

Oct. 16-20—National Safety Congress and Exposition, Congress, La Salle, Morrison, and Stevens Hotels, Chicago

Oct. 23-27—National Metal Congress and Exposition sponsored by American Society for Metals, American Welding Society, Metals Branch—American Institute of Mining and Metallurgical Engineers, and Society for Non-Destructive Testing, International Amphitheatre, Chicago

Oct. 27—Malleable Founders' Society, western sectional meeting, Drake Hotel, Chicago

Oct. 27-28—New England Regional Foundry Conference, New England Foundrymen's Society, Massachusetts Institute of Technology, Cambridge, Mass.

Nov. 2-3—Metals Casting Conference, sponsored by Purdue University with Central Indiana and Michiana Chapters of AFS, Purdue University, West Lafayette, Ind.

Nov. 2-3—Annual Conference on X-ray and Electron Diffraction, Mellon Institute for Industrial Research, Pittsburgh

Nov. 3—Malleable Founders' Society, eastern sectional meeting, Hotel Commodore, New York

Nov. 9-10 — National Foundry Association, annual meeting, Edgewater Beach Hotel, Chicago

Nov. 9-11—Steel Founders' Society of America, annual technical and operating conference, Carter Hotel, Cleveland

Nov. 10-11—Michigan Regional Foundry Conference, sponsored by Michigan AFS Chapters and Michigan State College, Michigan State College, East Lansing, Mich.

Dec. 1—Malleable Founders' Society, western sectional meeting, Drake Hotel, Chicago

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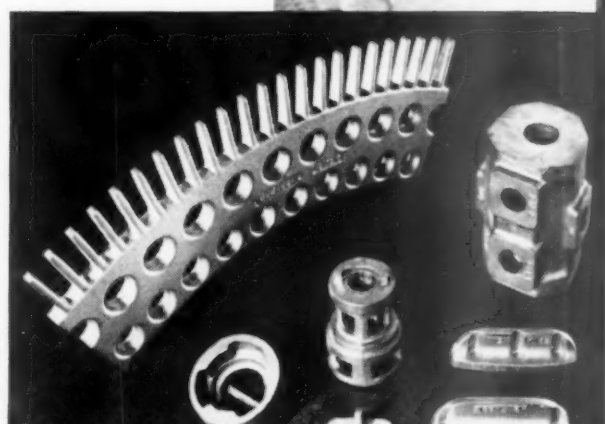
Famous Ampco Alloys start here...

Detroit ROCKING Electric Furnaces deliver uniform high-quality melts



To produce high quality alloys to make castings such as these, Ampco bought its first Detroit Rocking Electric Furnace in 1924 . . . today, Ampco has a huge battery of Detroit Electric Furnaces!

AMPCO METAL, INC., of Milwaukee, is famed the world over for its bronze alloy, Ampco Metal, and for other copper-base alloys. It is the foremost copper-base alloy plant in the U. S. specializing in refractory bronze alloys.

Ampco Gets Top Results

Ampco relies on its battery of Detroit Rocking Electric Furnaces to produce high-quality melts economically, to customers' rigid specifications. The rocking or "stirring" action of the furnaces always assures homogeneity. Neutral atmospheres maintained in the chambers minimize oxidation losses and inclusion of oxides in finished castings. Result: Ampco castings are of superior grain structure, show fine surface texture, are uniform in color, and show low scrap loss when machined.

For Ferrous Melting, Too

In ferrous melting operations, too, Detroit Rocking Electric Furnaces positively control composition and quality, and reduce metal shrinkage. Turnings, scraps and machinings are melted profitably, even when *no pigs* are used!

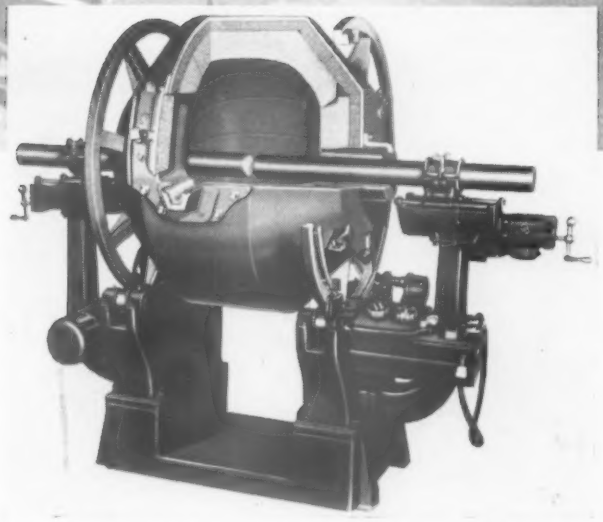
Detroit Electric Furnace rocking cycles are adjustable, and can be pre-set. Duplication of previous melts is remarkably easy. The electrodes always remain clear of the molten bath

Low MELTING COST
High QUALITY CONTROL
FOR FERROUS and NON-FERROUS METALS

for optimum power use, and to avoid carbon pick-up. All-electric operation ends worry over fuel shortages, ends, too, the cost of handling and storing bulky fuels. Detroit Electric Furnaces are available in 10 to 4000 lbs. capacities, with conical or cylindrical chambers which are easily, quickly replaceable.

Write for Savings!

For facts on how you save costs, get more high-quality melts per day, send us your production data. Our engineers will supply facts on Detroit Rocking Electric Furnaces that can save you money in your own foundry operation. Write today!



Cutaway of a Detroit Rocking Electric Furnace showing position of electrodes and the refractory lining. Note thick insulation which retains all the heat for melting, keeps foundry area temperatures low.

DETROIT ELECTRIC FURNACE DIVISION

KUHLMAN ELECTRIC COMPANY, BAY CITY, MICHIGAN

Foreign Representatives: In BRAZIL—Equipamentos Industrias "Eisa" Ltd., Sao Paulo, CHILE, ARGENTINA, PERU and VENEZUELA: M. Castellvi Inc., 150 Broadway, New York 7, N. Y., MEXICO: Casco, S. de R. L. Atenas 32, Despacho 14, Mexico City, D. F.

By EDWIN BREMER

Foundry DEVELOPMENTS

NEWLY suggested material for producing cores for use in aluminum and magnesium alloy castings is perlite, a volcanic glass. As described in U. S. Patent No. 2,487,207, the material in expanded form is screened to provide grains of suitable size in accordance with the desired surface finish on the castings, and mixed with a binder composed of 11 parts pine rosin, 40 parts urea formaldehyde resin, and 49 parts siliceous clay. Combination is 3 to 5 per cent binder with 95 to 97 per cent perlite with sufficient water to make it workable. It is claimed that the material provides adequate venting of gases, presents a wall impervious to molten metal, and after use is friable and easily removed from the casting.

* * *

DEVELOPED originally for rapid inspection of gas turbine engine parts for surface flaws and discontinuities by Northrop Aircraft Inc., Hawthorne, Calif., a test procedure incorporates use of a red penetrant dye, a surface cleaner and dye remover, and a white developer solution. In practice the dye is applied by brushing, spraying or dipping and allowed to remain for five minutes. Then it is wiped off with the surface cleaner, and the developer solution applied. In a short time cracks and other surface discontinuities show up as scarlet lines, etc. against the white background.

* * *

CHROMIUM added to cast iron through the cupola gives greater stability than that added in the ladle, according to *Vancoram Review* published by Vanadium Corp. of America. In some cases that is advantageous while in others it is not, depending upon the application. Iron foundry grade ferrochromium was developed especially for use in cast iron because of its faster rate of solution. Lump size is used for cupola addition while 8 mesh x down and finer sizes are used for final adjustment for composition in the ladle. For hand ladle additions 20 mesh x down is used. Chromium recovery from ladle additions is usually 80 to 90 per cent. Ferrochromium briquets also are used for cupola additions. Each contains 2 lb chromium as high-carbon ferrochromium. Briquets permit recovery of 90 to 95 per cent chromium.

* * *

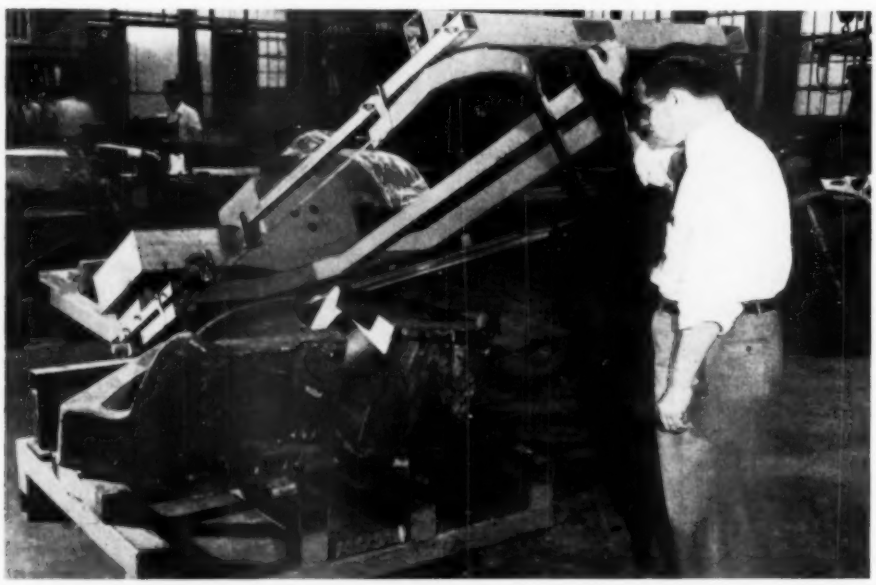
RAPID method for metallographic polishing of nonferrous specimens containing two or more phases differing greatly in hardness is described in the March issue of the *Journal* of the Institute of Metals (Great Britain). Instead of the usual coarse polishing agents such as a proprietary metal polish, alumina, or magnesia, Perryman used fine diamond dust (0-1 micron), and obtained a reduction in total polishing time with a reduction in relief between phases differing widely in hardness.

* * *

EMPLOYMENT of fluorine compounds such as fluoborates in gray iron is described in U. S. Patent No. 2,494,238, and it is claimed that they act catalytically with strong deoxidizing properties, decreasing or eliminating shrinks, and blowholes and segregation, and stabilize the graphitic combined carbon. They also act as graphite refining elements in decreasing flake growth. Amounts indicated are 5 lb per 1000 lb of iron.

* * *

"SOLDERS and Soldering" is the title of a circular recently published by the National Bureau of Standards which describes in detail types of solders and soldering procedures. Instructions are given for the proper use of soft solders, pressure metal solders, and common brazing solders for joints of the required strength. Selection of fluxes, which can be as important as the choice of solder, is discussed adequately. Illustrations of different types of soldered joints are shown, and trends in soldering equipment are discussed and illustrated. Circular 492, "Solders and Soldering," is available from the Superintendent of Documents, Government Printing Office, Washington 25, for 15c.



Problem of cutting up large obsolete drop hammer dies into pieces easy to handle has been solved at Glenn L. Martin Co., through use of a saw developed by Jay M. Boyd Jr. Designed on the principle of a bandsaw, the device will cut a 5-ton die in two in 55 minutes. Saw can be operated by one unskilled worker without danger, and can be moved easily

Solving Weight Problems the *Logan* way . .

Handling heavy loads is a daily task in the modern foundry. And it is a task with which skilled and experienced Logan Conveyor engineers are thoroughly familiar.

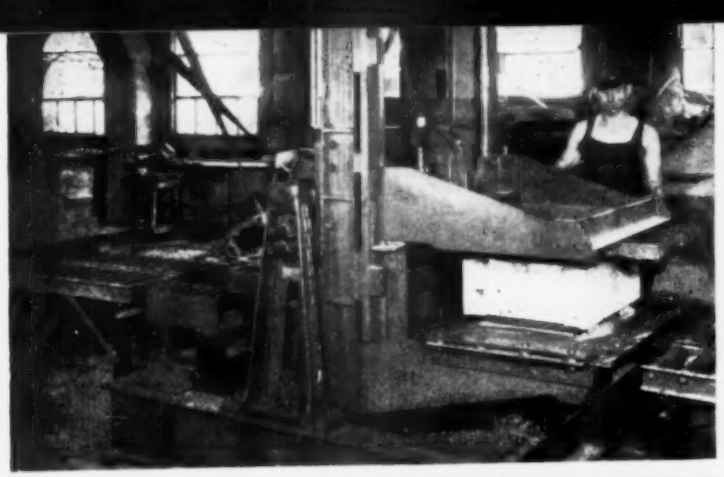
Molds weighing up to 5000 pounds, massive flasks and castings — all move in controlled ease over Logan heavy-duty equipment. No costly breakdowns and no high maintenance expense.

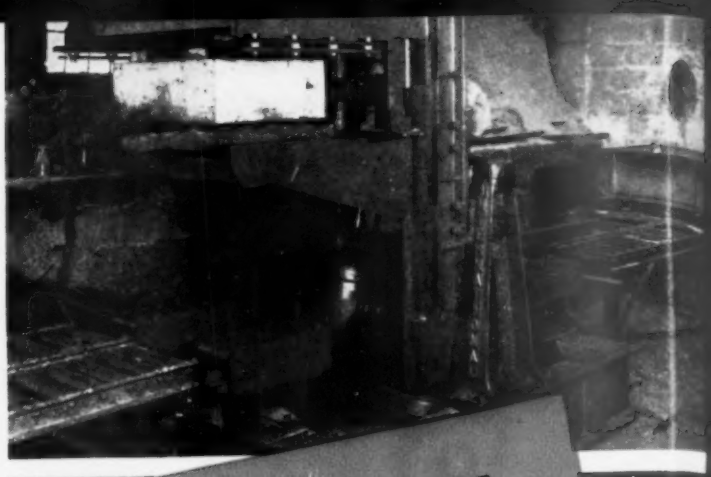
Logan foundry conveying experience dates back over two generations of service to the nation's leading foundries. Remember, it's good business to conveyorize every possible operation. Write today for literature or for an engineer to call.

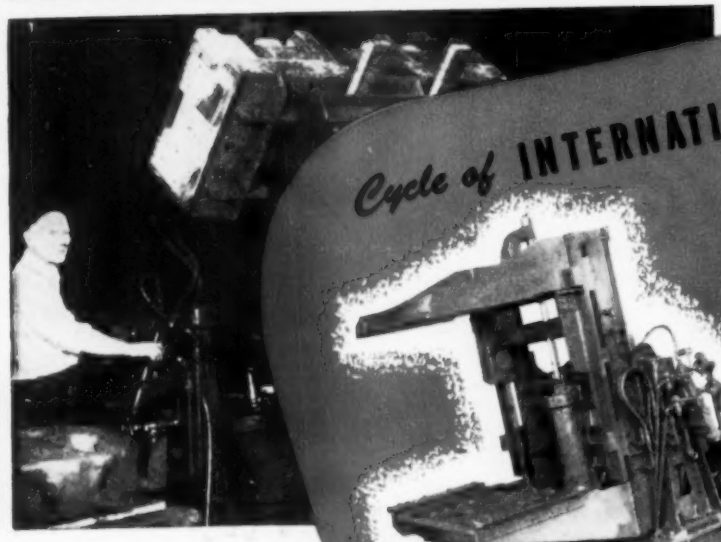
Pouring in this modern steel foundry is accomplished by means of a monorail system as molds pass underneath on Logan Roller Conveyor. Molds are received from storage lines and are delivered to Pouring Line via Switch Section and differential Roller Curve in foreground.

Logan Conveyors

LOGAN CO., 580 CABEL ST., LOUISVILLE, KY.







Cycle of INTERNATIONAL TYPE AN MACHINE

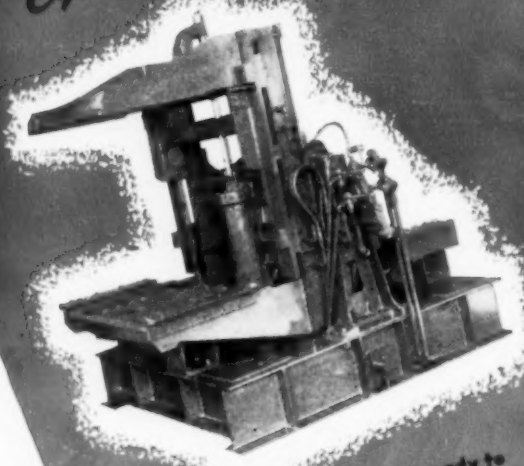


FIGURE 1 shows the machine ready to receive the core box or mold after it has been rammed.

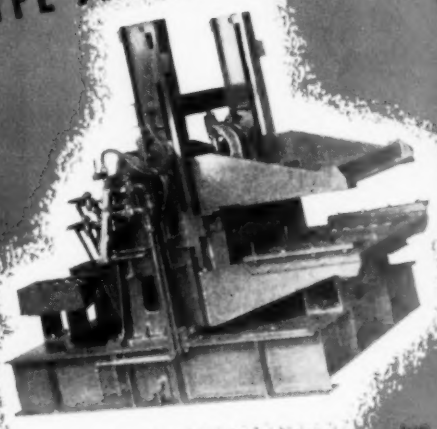


FIGURE 2 shows that the clamp valve has been operated to bring the upper frame down to clamp the core plate to the box or bottom board to flask. The movement of this frame is automatically limited according to the depth of the box or overall of pattern plate flask and bottom board.

FIGURE 3 shows that the turnover valves of the machine have been operated so that the entire center unit which supports the turnover frame of the machine—carrying the clamped box or complete half mold—is turned over.

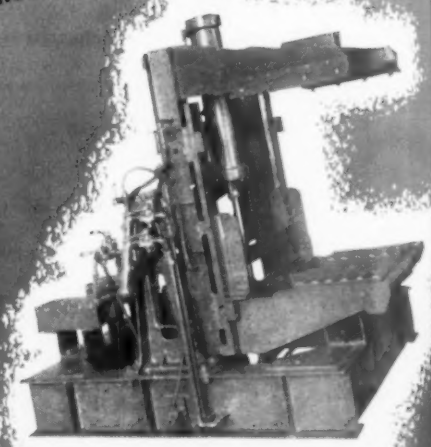
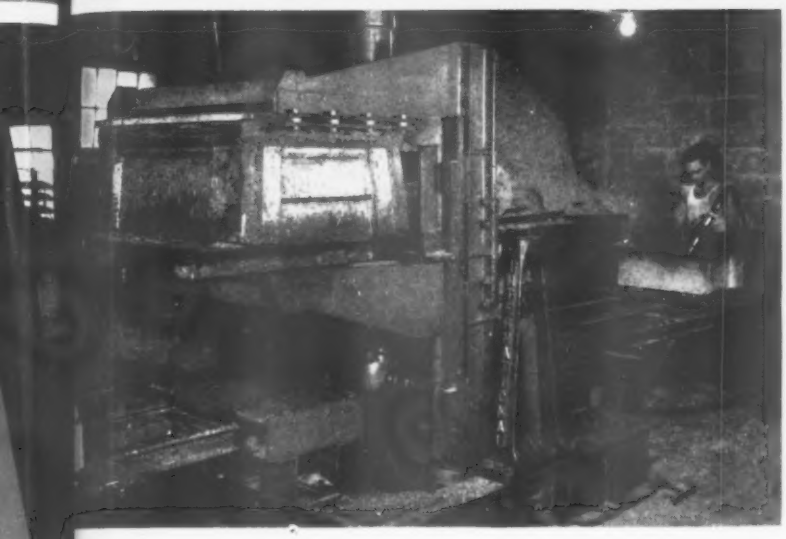


FIGURE 4 shows that the clamp cylinder has been exhausted, releasing the core plate—supporting the core—bottom board supporting the mo from the turnover frame, thus affo ing the draw of the machine. T vibrator operates while the draw tion is taking place.



Hard to Draw . . . Short Run . . . Many Different Sizes of Jobs

International Type AN Machine for clamping and turning over core boxes or flasks and for drawing the core or mold. No rigging time is required for this machine. The core box or pattern is fastened to the turnover frame by sliding the cleats that have been fastened to the under side of the box or pattern plate into the grooves with which the turnover frame has been provided. Absolutely no adjustments are required. When boxes or patterns are changed from one size to another, the variations are automatically taken care of, irrespective of how much difference there is in the width, length and depth of the boxes or flasks for which the machine has been recommended.

INTERNATIONAL MOLDING MACHINE COMPANY - La Grange Park, Illinois

Activities of Foundry GROUPS

Central New York

ANNUAL June outing of Central New York Chapter of the AFS was held June 16 at Hinerwadel's Grove, Syracuse, N. Y. Approximately 175 members and guests enjoyed an afternoon and evening of social activities which included all the trimmings of an old-fashioned clambake.

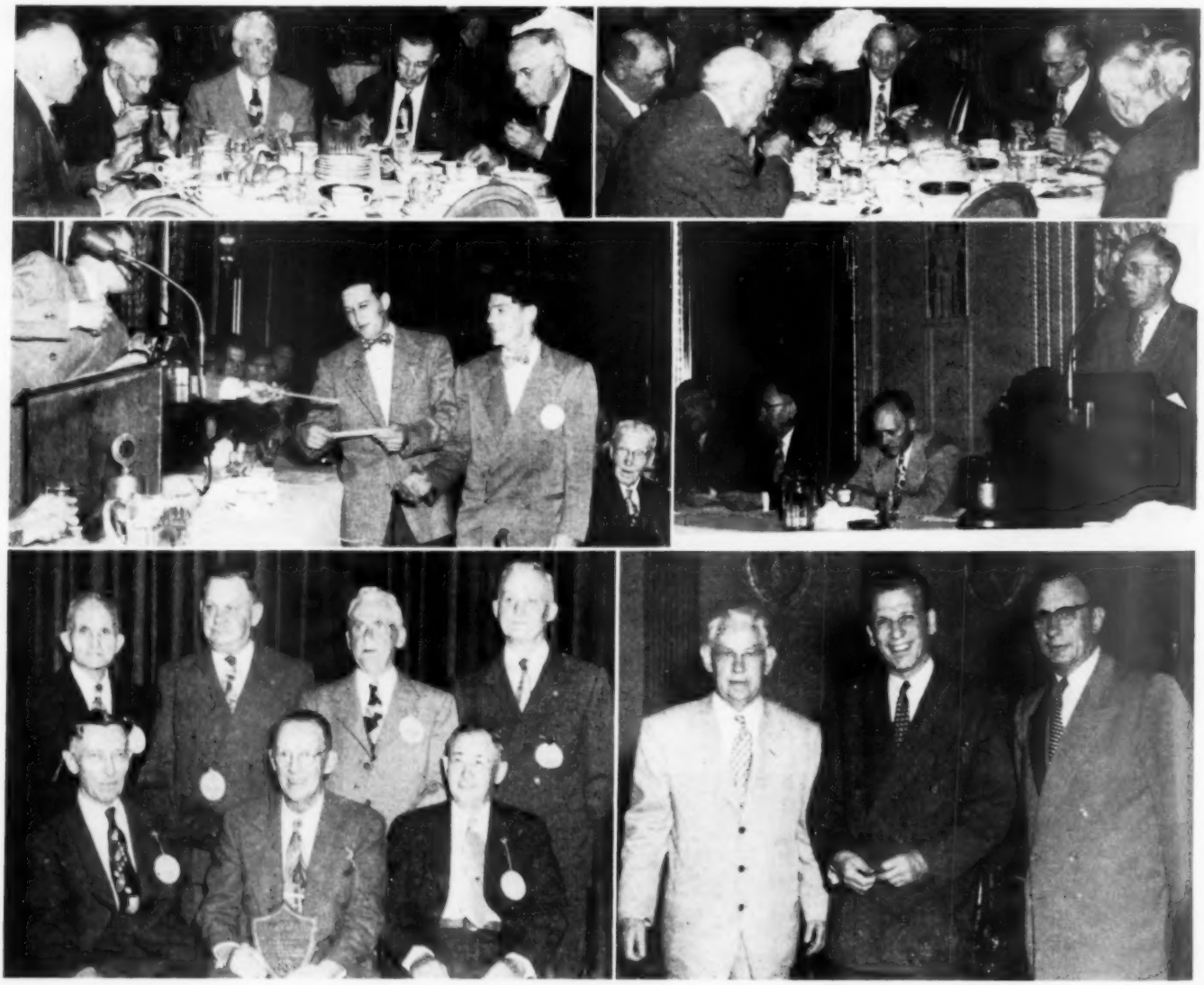
Syracuse area foundries which sponsored the affair were: S. Cheney & Son, Crouse-Hinds Co., Oberdorfer Foundries Inc., Caldwell & Ward Brass Co., Syracuse Foundry Inc., Stanton Foundry Inc., Straight Line Foundry & Machine Corp., Syracuse Chilled Plow Co. Inc., Meloon Bronze Foundry Inc., and Fay Foundry Corp.—*John A. Feola, Crouse-Hinds Co.*

Eastern New York

ANNUAL meeting of Eastern New York Chapter of the AFS was held June 20 at Circle Inn, Lathams, N. Y. Speaker was Howard W. Davenport of the public relations department, New York Telephone Co., Albany, N. Y., and his subject was "Highways of Speech."

Officers for the coming year were introduced by retiring chairman K. F. Echard. Newly elected chairman Jasper Wheeler, Wheeler Bros. Brass Foundries, Troy, N. Y., resigned the post due to a recent illness and Leo M. Scully, Scully Foundry & Machine Co., Coxsackie, N. Y., was elected to serve in that position for the coming

(*Concluded on page* 151)



WISCONSIN Chapter of the AFS honored old timers and apprentices June 13 at the Schroeder Hotel, Milwaukee. Seven new members who have served the foundry industry 50 or more years were added to the group. They are shown at lower left. At center row right Walter W. Edens, Badger Brass & Aluminum Foundry Co., Milwaukee, incoming chapter president, is shown addressing the meeting. Photos by courtesy of Walter V. Napp, Badger Firebrick & Supply Co.

The perfect green bond...

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LARGEST SELLER IN THE FIELD

MOGUL makes smoother cores

MOGUL cuts down discards

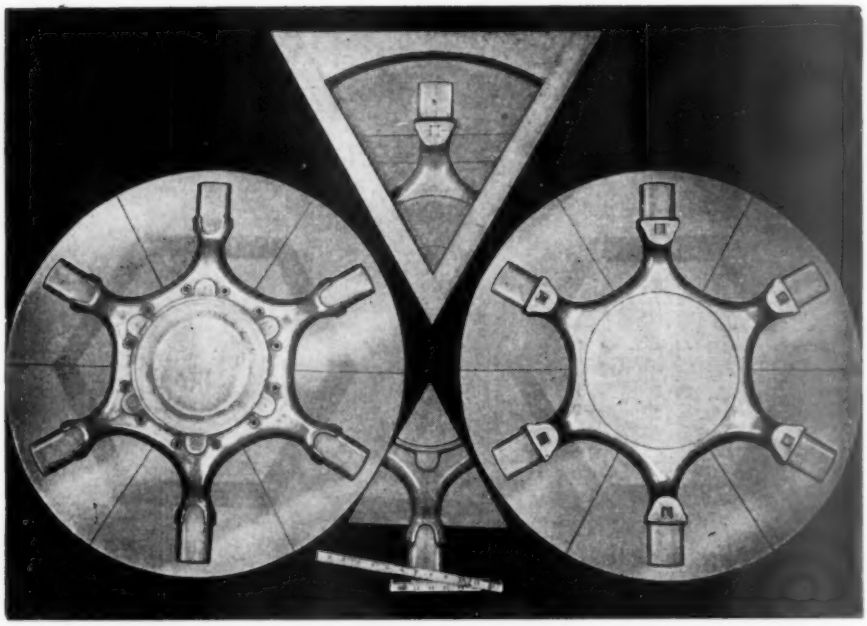
Full technical service, without obligation, is available to show how you can profit from the use of MOGUL Cereal Binder in your production.

Write Technical Sales Department

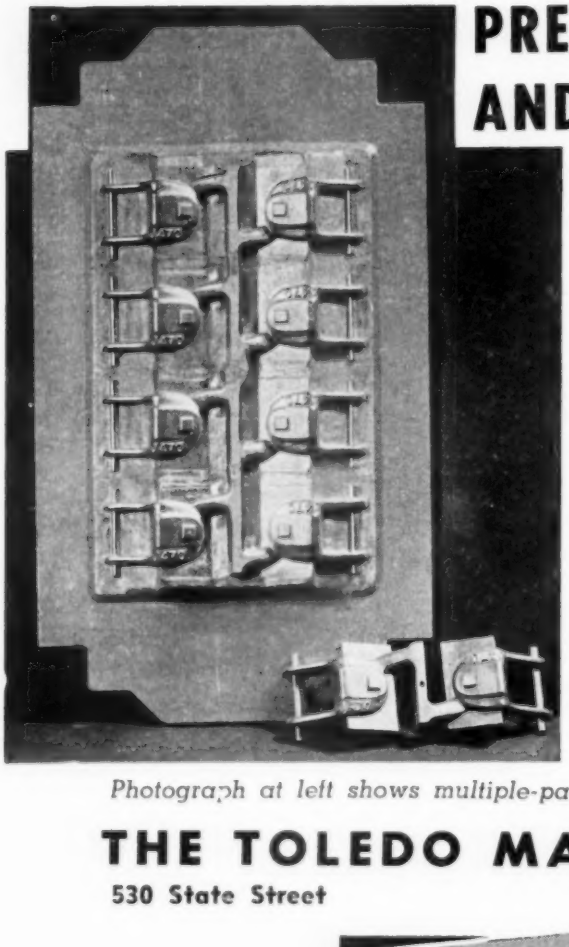
CORN PRODUCTS
REFINING COMPANY
17 Battery Place • New York 4, New York

— the preferred dry bond for cores

Illustration at right shows cope and drag equipment for truck wheel, made from one spoke (1-6) of wheel. Photograph by courtesy of Erie Malleable Iron Company.



NOW—INCREASE YOUR FOUNDRY PRODUCTION AND BRING DOWN YOUR COSTS BY USING OUR PRESSURE CAST MATCHPLATES AND COPE AND DRAG PLATES



You sure can do that, because Plaster Process matchplates are accurately reproduced from one master pattern in plaster molds and are cast under pressure. Our pattern castings and core box castings eliminate the former necessity of lightening core boxes and of "backing off" master patterns. Also made by the same method are multiple core boxes with flat or irregular partings and white metal dryer patterns properly cleared to fit the cores.

★ ★ ★

Write for price schedule and layout sheets

Photograph at left shows multiple-pattern matchplate made from single master pattern.

THE TOLEDO MATCHPLATE COMPANY

530 State Street **Toledo 2, Ohio**

Pressure-Cast MATCHPLATES
COPE and DRAG PLATES

(Affiliate: Plaster Process Castings Company, 6922 Carnegie Ave., Cleveland 3, Ohio)

PROFIT BY OUR MANY YEARS OF EXPERIENCE

(*Concluded from page* 148)

year. J. E. Waugh, foundry division of General Electric Co., Schenectady, N. Y., is vice chairman. New directors are Prof. Scott Mackay, Rensselaer Polytechnic Institute, Troy, N. Y.; R. N. Williams, George F. Pettinos Inc.; and Lee Martin, Northern Indiana Brass, Glens Falls, N. Y.—*George Danner, American Locomotive Co.*

Northern California

MOST successful "Ladies Night" ever staged by Northern California Chapter of the AFS held sway at the Orinda Country Club June 16. More than 150 foundrymen, guests and their wives enjoyed a splendid supper dance and tops in entertainment which included two television performers from San Francisco.

Outgoing Chairman James Francis, Vulcan Steel Foundry Co., Oakland, Calif., turned over the rammer to John Russo, Russo Foundry Equipment Co., Oakland, for the coming year.

The following were responsible for planning the party: J. M. Snyder, National Grinding Wheel Sales Agency, chairman; E. H. Brumley, Brumley-Donaldson Co., co-chairman; Harry Miller, Ingersoll-Rand Co.; Ed. Rowe, Balfour-Guthrie Co.; Roy Hoag, General Metals Corp.; Charles Marshall, Industrial Foundry Supply Co.; William Skinner, Pacific Graphite Works; James Rimmer, Columbia Steel Co.; Ray Jerome, Pacific Grinding Wheel Co.; Daniel Henry, Federated Metals Division, American Smelting & Refining Co.; Martin Verbeet, Atkins-Kroll; John Russo Russo Foundry Equipment Co.; Matt Morison, H. L. E. Meyer Co., and Peter Valentine Jr., Del Monte Properties.—*J. M. Snyder, Jos. Musto Sons-Keenan Co.*

Wisconsin

FIFTEENTH annual golf outing and dinner of Wisconsin Chapter of the AFS was held July 21 at the Ozaukee Country Club, Milwaukee, with approximately 745 members and guests participating. More than 100 played golf during the afternoon, and following dinner, golf and attendance prizes were awarded and a floor show was presented. Committee in charge of arrangements included: Marvin A. Knoller, chairman; Seward E. Shaver, co-chairman; Norman Amrhein, C. N. Spidell, A. R. Jones Jr., E. C. Meagher, William T. Schmidt, Harold Ziebell, C. A. Gehrman, J. V. Olle and Leon H. Decker. Top golf player was Harold Ziebell who made a hole in one.—*John E. Hubel.*

CANADIAN FOUNDRY CONFERENCE

Scheduled for Sept. 28-29-30

WITH the theme "Good Castings are Permanent," a diversified program has been arranged by the Ontario Chapter of the American Foundrymen's Society for the All-Canadian Foundry Conference it will sponsor Sept. 28-29-30. Meetings and registration will be at the Royal Connaught Hotel, Hamilton, Ont.

In addition to technical sessions scheduled for the afternoon of Friday, Sept. 29, the program includes plant visitations the first two days of the conference and a complete sand course. This course, to be held during the three days, will be conducted by the Harry W. Dietert Co., Detroit.

Visits to district foundries are being arranged for the afternoon of Sept. 28 and the morning of Sept. 29. Plants open for inspection will be Canadian Westinghouse Co. Ltd., Dominion Foundries & Steel Ltd., International Harvester Co. of Canada Ltd. and A. H. Tallman Bronze Co. Ltd., all of Toronto, and Massey-Harris Co. Ltd., "M" Foundry, Brantford, Ont.

Other events inclue a luncheon and dinner, Sept. 28, the latter to be addressed by Bruce Simpson, National Engineering Co., Chicago. The banquet at 7 p.m. Friday night will be preceded by a reception at 6 p.m. and will be followed by entertainment. E. A. McFaul of Chicago will be the banquet speaker.

Two technical sessions will start at 2 p.m. Friday. A nonferrous session, presided over by F. B. Diana, Z. Wagman & Sons, Toronto, will have James G. Dick, chief metallurgist, Canadian Bronze Co. Ltd., Montreal, speaking on "Melting of Brass & Bronze." J. Perkins, Ford Motor Co. of Canada Ltd., Windsor, Ont., will be chairman of the ferrous session at which the speaker will be Harold N. Bogart, Ford Motor Co., Dearborn, Mich., and the subject, "Up-to-date Melting Mediums for Cast Iron, Malleable and Steel."

R. H. Williams, Canadian Westinghouse Co. Ltd., is general chairman of the conference.

Arrange for Purdue Casting Conference

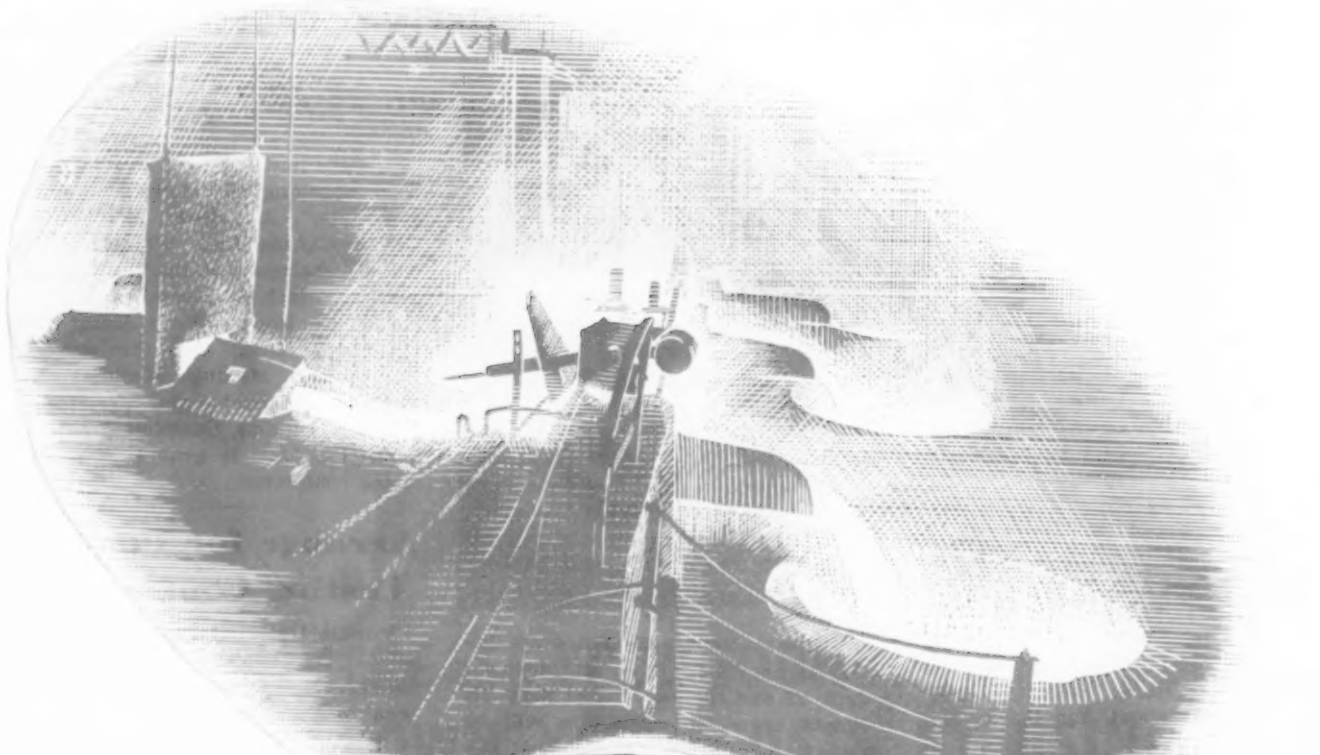
Purdue University will be the site of the third annual Metals Casting Conference sponsored by the Michiana and Central Indiana Chapters of the American Foundrymen's Society and the university, Nov. 2 and 3.

L. L. Andrus, American Wheelabrator & Equipment Corp., Mishawaka, Ind., is conference chairman. Prof. C. T. Marek, Purdue, is vice chairman, and Prof. R. W. Lindley is secretary. Robert Spurgin III, Swayne-Robinson & Co., Richmond, Ind., is program chairman.

Other conference planning committee members are S. F. Swain, Golden Foundry Co., Columbus, Ind.; W. O. Ferrell, Auto Specialties Mfg. Co., St. Joseph, Mich.; Paul Harlan, Electric Steel Castings Co., Indianapolis; Allen J. Reid, General Refractories Co., Indianapolis; L. D. Reiff, Superior Steel & Malleable Castings Co., Benton Harbor, Mich.;

(*Continued on page* 153)

NORTHERN CALIFORNIA Chapter of the AFS held its annual ladies' night at the Orinda Country Club June 16. John R. Russo, Russo Foundry Equipment Co., Oakland, Calif., (right) 1950-51 chapter chairman, is shown accepting the traditional rammer from Retiring Chairman J. L. Francis, Vulcan Steel Foundry Co., Oakland. Photo courtesy of Samuel D. Russell, Phoenix Iron Works



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GREENSBORO • INDIANAPOLIS • MINNEAPOLIS • ST. LOUIS • WASHINGTON
IRON ORE • PIG IRON • COAL • COKE

(*Continued from page* 151)

V. S. Spears, American Wheelabrator & Equipment Corp., Mishawaka, Ind.; Prof. H. A. Bolz and M. M. McClure of Purdue.

The program will open with a discussion of recent engineering developments in the foundry industry. A talk on casting design will emphasize the relationship of design to production methods. The educational program of the Foundry Educational Foundation will be reviewed. A motion picture showing the latest developments in fluid flow and tech-

Southern California Chapter Sponsors Essay Contest

EDUCATIONAL committee of Southern California Chapter of the AFS, under the chairmanship of E. K. Smith, foundry consultant, this year conducted a prize essay contest among students of 16 junior colleges and technical schools. Preliminary arrangements included calling on state, county, and city boards of education to obtain the necessary permits and then to present the idea to the educational institutions.

The plan was to conduct selected groups of students through nearby foundries. Students were invited to submit brief essays covering any phase of their reaction to the foundry. Suitable prizes were offered as incentives.

The object of this contest was to interest students at college level in the foundry as a place to seek employment at the completion of their training and to show many of the prospective designers and engineers that castings have many advantages.

Of the 18 junior colleges and trade schools contacted, 16 had groups of students take supervised tours through foundries. The foundries were extremely co-operative and furnished guides to conduct the student tours and answer questions. A total of about 650 students made the tours, and 50 essays were submitted.

In the committee's opinion the essays showed unusual merit. It also feels that a new link has been established between education and the foundry industry. Many of the colleges requested that the contest be repeated.

Essay contest winners and their instructors were the guests of Southern California Chapter at its May 19 meeting at Rodger Young Auditorium, Los Angeles. Names of winners follow with their instructor's name in parentheses: First prize, $50—Keizo Suenaga, Pasadena City College (W. Todd), "Important Facts of Foundry Operation." Second, $35—Robert Waltman, East Los Angeles City College (C. Guse), "An Adventure in Foundrying." Third, $25—James F. D'Amelio, San Bernardino Valley College (Schmier), "The Acid Electric Furnace." Fourth, $20—John Hawkins, Santa Monica Technical School (J. R. Hall), "A Point of Interest."

Prizes of $10 each were awarded to the best essay from each of the other competing colleges: Mrs. Virginia Arias Horrocks, Los Angeles Harbor Junior College (H. H. Jones), "The Making of a Metal Casting." Alvin Weisbrod, Fullerton District Junior College (Hart), "Work in a Foundry." John Broy, Wiggins Technical-Trade Institute (W. Kirsch), "A Machinist Meets the Foundry." David J. McMillian, Glendale College (J. Shively), "A Foundry is a Good Place to Work." John G. Guidero, Los Angeles City College (C. R. Laubenfels), "Foundry Process." Don Olson, El Camino College (R. D. Boothe), "Foundry." Don Peterson, Compton College (W. A. Myers), "My Trip Through a Foundry." Clyde Davies, Mt. San Antonio College (L. Spore), "Visiting a Foundry."

At left, left to right, are: Robert Waltman, second-prize winner in the essay contest; Earle Shomaker, Kay-Brunner Steel Products Inc., Alhambra, Calif., chapter president; E. K. Smith, and Keizo Suenaga, first-prize winner. Below—Group of students from Glendale College inspecting pouring of molds at Axelson Mfg. Co., Huntington Park, Calif. John Shively, instructor, is at left; James Eppley, Axelson foundry superintendent, is at right

nical talks will cover gating and risering and foundry sand.

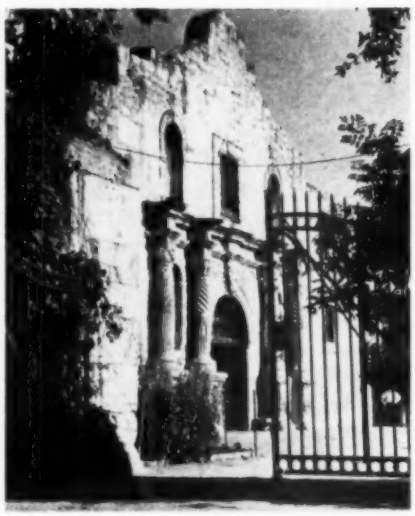
New feature of the conference will be a display of foundry products, accompanied by photographs taken in the industry, to demonstrate unique methods in producing castings and the solutions to design problems which have resulted in more profitable methods of production.

TEXAS FOUNDRY CONFERENCE

To Be Held Oct. 5-6

TECHNICAL sessions covering a diversified list of subjects are scheduled for the first Texas Regional Foundry Conference. The two-day meeting, sponsored by the Texas Chapter and the Texas A & M College Student Chapter of the American Foundrymen's Society, is to be held at the Hotel Plaza, San Antonio, Thursday and Friday, Oct. 5-6. James R. Hewitt, distributors' representative, Houston, is general chairman of the conference. Walter J. Temple, San Antonio, is co-chairman.

In addition to the technical sessions devoted to individual metals, a general session on the subjects of patterns and coreboxes will open the conference Thursday morning. Program covers all branches of the foundry industry, featuring speakers who are nationally recognized authorities on their subjects. Luncheon sessions on Thursday and Friday, a Texas barbecue Thursday evening, and a banquet Friday evening will complete the program. Conference reservations are being handled by C. R. McGrail, Texaloy Foundry, 1407 Hoefgen St., San Antonio.



The Alamo—Shrine of Texas liberty

Tentative program follows:

Thursday, Oct. 5

8-9:30 a.m.—Registration

10 a.m.-12 noon—General Meeting: "Patterns as They Influence Foundry Operations," by A. F. Pfeiffer, Allis Chalmers Mfg. Co., Milwaukee. "Core Boxes for Core Blowing," by Harry J. Jacobson, Industrial Pattern Works, Chicago

12:30-1:50 p.m. — Luncheon Meeting: Walton Woody, National Malleable & Steel Castings Co., Cleveland, and national president American Foundrymen's Society. Introduced by Thomas H. Shartle, Texas Electric Steel Casting Co., Houston, Tex., and president Steel Founders' Society of America

2-3:30 p.m.—

Steel: "Labor Aids in the Steel Foundry," William B. Ziegelmueller, Electric Steel Casting Co., Indianapolis

Gray Iron: "Present Status of Ductile Iron," Donald J. Reese, International Nickel Co., New York

Nonferrous: "Aluminum Gating, Risering and Foundry Practice," T. E. Kramer, William F. Jobbins Inc., Aurora, Ill.

Technical: "Synthetic Foundry Sand Practice," C. A. Sanders, American Colloid Co., Chicago. "Availability and Application of Natural Bonded Sands," E. C. Sawyer, Ayers Mineral Co., Zanesville, O.

6:30 p.m.—Texas Barbecue

Friday, Oct. 6

9-12 noon—General Meeting: "Does Core Blowing Belong in My Shop?" Zigmond Madacey, Caterpillar Tractor Co., Peoria, Ill.; L. P. Robinson, Archer - Daniels - Midland Co., Cleveland; Lawrence D. Pridmore, International Molding Machine Co., LaGrange Park, Ill.

12:30-3 p.m.—Roundtable Luncheon:

Steel: "Melting Practice for Steel Castings," James Bowers, American Cast Iron Pipe Co., Birmingham

Gray Iron: "Why Do We Do It, When We Know It's Wrong," S. C. Massari, technical director, American Foundrymen's Society

Nonferrous: "Gating, Risering and General Discussion on Nonferrous Castings," William Ball, R. Lavin & Son, Chicago

3:30-5 p.m.:

Steel: "Current Alloy Practices for Steel Castings," E. A. Brandler, Electro Metallurgical Division, Birmingham

Gray Iron: "Cupola Practice," W. W. Levi, Lynchburg Foundry Co., Lynchburg, Va.

Nonferrous: "Melting Practice and Gases in Nonferrous Metals," R. A. Colton, Federated Metals Division, Barber, N. J.

7 p.m.—Banquet: Hon. Mayor White, San Antonio; Dr. Harold Vagtborg, Southwest Research Institute, Houston—"Industrial Potential of the Southwest."

CHAPTER OFFICERS: Representatives of all American Foundrymen's Society chapters met at Chicago, June 26-27, for the annual Chapter Officers Conference. The program comprised an intensive discussion of subjects affecting the efficient functioning of the chapters and the society as a whole. AFS President Walton L. Woody presided, assisted by Vice President Walter L. Seelbach, Past President E. W. Horlebein and AFS Chicago headquarters staff members

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See how this large Mid-Western foundry has speeded up its modernization program ... getting full service life from its outmoded cast flasks by replacing them as they fail, with

BS&B
HEAVY DUTY
Fabricated Steel
FOUNDRY FLASKS

• Another triumph for the versatility of welded steel flasks! BS&B production facilities easily achieved matching duplicates, and the old cast flasks will serve out their full life.

Soon the whole shop will be modernized .. Heavy Duty Welded Steel Flasks throughout. Full gauge metal adds extra strength. Two-piece bearing-bar is wider and thicker . . . may be machined four or five times to renew the surface. Double welding of bearing bar prevents warping, insures full bearing surface, adds great strength. BS&B construction does not require stress-relieving or normalizing.

You, too, can get far longer service with BS&B Welded Steel Flasks. Built to specifications, or standard sizes to meet every casting need. BS&B also manufactures all-steel bottom boards and core plates.

Remember, BS&B builds your business with hard-hitting advertising to casting BUYERS in STEEL, IRON AGE, PURCHASING. Look for them. Profit with BS&B!

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LOS ANGELES, CALIF.
Independent Foundry Supply Co.
MINNEAPOLIS, MINN.
Wisner & Co.
MONTREAL, CAN.
Canadian Foundry Sup. & Equipment, Ltd.
OAKLAND, CALIF.
Pacific Graphite Co., Inc.
PHILADELPHIA, PA.
Pennsylvania Foundry Sup. & Sand Co.
PITTSBURGH, PA.
S. Obermayer Co.
ST. LOUIS, MO.
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Canadian Fdry. Sup. & Equipment, Ltd.

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Foundry STATISTICS

Ingot Brass and Bronze

(Shipments in net tons)

	1949	1950
Jan.	19,456	18,874
Feb.	15,026	18,487
Mar.	14,550	22,494
Apr.	10,695	22,118
May	11,114	23,643
June	9,696	25,093
July	10,220	.....
Aug.	14,194	.....

Source: Ingot Brass and Bronze Industry.

Foundry Production Workers

Estimated Number

	Apr. 1950	Mar. 1950	Apr. 1949
Iron & Steel	188,000	182,000	198,400
Nonferrous	70,700	69,800	62,200
Average Weekly Earnings			
Gray Iron	$62.01	$59.85	$51.73
Malleable Iron	63.49	61.50	52.98
Steel	62.83	60.72	56.55
Nonferrous	64.34	63.47	58.79
Average Weekly Hours			
Gray Iron	41.2	40.3	35.9
Malleable Iron	40.7	39.5	34.9
Steel	40.3	39.1	37.3
Nonferrous	40.8	40.4	38.0

Labor Turnover Rate (Apr.)
(Per 100 employees)

	Total Accession	Total Separation	Quit	Layoff
Gray Iron	4.8	3.1	1.4	1.2
Malleable Iron	6.2	4.6	2.3	1.6
Steel	5.5	2.0	1.1	0.6
Nonferrous	5.7	3.8	1.6	1.7

Source: Bureau of Labor Statistics.

Index of Foundry Equipment Orders

Foundry Trades Only

(Net Orders Closed, New Equipment)

	1949	1950
Jan.	149.9	159.3
Feb.	144.4	113.1
Mar.	190.8	225.2
Apr.	172.0	160.6
May	121.9	294.9
June	164.9	622.7
July	146.6	.....
Aug.	127.1	.....
Sept.	166.6	.....
Oct.	133.5	.....
Nov.	270.4	.....
Dec.	201.0	.....

Note: Figures are percentages of the base period 1937-1939 taken as 100 per cent (monthly average). Source: Foundry Equipment Manufacturers Association.

Shipments of Castings

(Reported by Bureau of the Census)

Gray Iron

(Net tons)

	Shipments Total	Shipments For Sale	Unfilled *Orders
1948			
Total	12,785,909	7,131,405	.....
1949			
Apr.	929,307	467,433	1,445,532
May	866,631	439,420	1,243,266
June	905,573	455,442	1,086,989
July	696,915	341,657	1,031,963
Aug.	872,013	445,981	1,048,308
Sept.	880,647	459,014	980,070
Oct.	715,685	397,939	955,100
Nov.	718,703	395,107	938,629
Dec.	862,172	440,409	892,458
Total	10,549,284	5,517,527	.....
1950			
Jan.	913,321	449,577	914,185
Feb.	864,189	416,594	873,455
Mar.	995,782	500,195	921,575
Apr.	981,126	483,862	922,255
May	1,095,111	572,887	977,833

Steel

(Net tons)

	Shipments Total	Shipments For Sale	Unfilled *Orders
1948			
Total	1,760,032	1,335,295	.....
1949			
May	106,178	75,537	191,473
June	116,052	84,112	173,237
July	78,710	50,124	155,494
Aug.	89,964	59,412	143,566
Sept.	86,502	55,853	127,664
Oct.	70,690	48,263	124,817
Nov.	76,437	50,685	117,865
Dec.	84,508	53,079	122,887
Total	1,243,502	865,297	.....
1950			
Jan.	88,821	57,996	142,484
Feb.	91,827	62,045	165,186
Mar.	111,772	77,588	185,611
Apr.	106,964	75,133	201,643
May	117,944	83,845	198,078
June	130,491	94,637	206,799

Malleable

(Net tons)

	Shipments Total	Shipments For Sale	Unfilled *Orders
1948			
Total	933,265	525,212	.....
1949			
May	54,572	27,643	78,944
June	59,597	32,639	69,865
July	44,360	23,216	70,796
Aug.	58,121	30,327	61,330
Sept.	60,488	30,646	57,512
Oct.	57,150	28,582	54,322
Nov.	49,439	25,250	55,795
Dec.	57,379	29,679	60,835
Total	713,107	370,967	.....
1950			
Jan.	62,874	32,918	62,307
Feb.	60,386	31,249	67,049
Mar.	66,259	38,639	69,866
Apr.	69,822	36,279	76,250
May	76,161	42,432	77,074
June	82,345	46,613	86,783

Copper-base Alloys

(Thousands of pounds)

	Shipments Total	Shipments Sand	Shipments Perm. Mold	Unfilled *Orders
1948				
Total	1,030,825	930,790	59,069	.....
1949				
Apr.	59,573	52,837	3,458	32,746
May	53,699	48,004	2,830	30,926
June	52,616	47,678	2,552	26,786
July	43,273	39,372	2,129	26,013
Aug.	58,055	53,203	2,929	26,071
Sept.	60,771	55,221	2,729	26,527
Oct.	58,249	52,861	2,316	23,634
Nov.	61,818	56,669	2,811	23,625
Dec.	63,873	58,291	3,086	23,435
Total	725,318	654,444	37,311	.....
1950				
Jan.	65,585	58,878	3,440	25,216
Feb.	67,029	60,257	3,626	26,923
Mar.	80,442	71,876	4,693	27,631
Apr.	72,318	64,773	3,848	28,769
May	79,108	71,605	3,751	30,880

Magnesium

(Thousands of pounds)

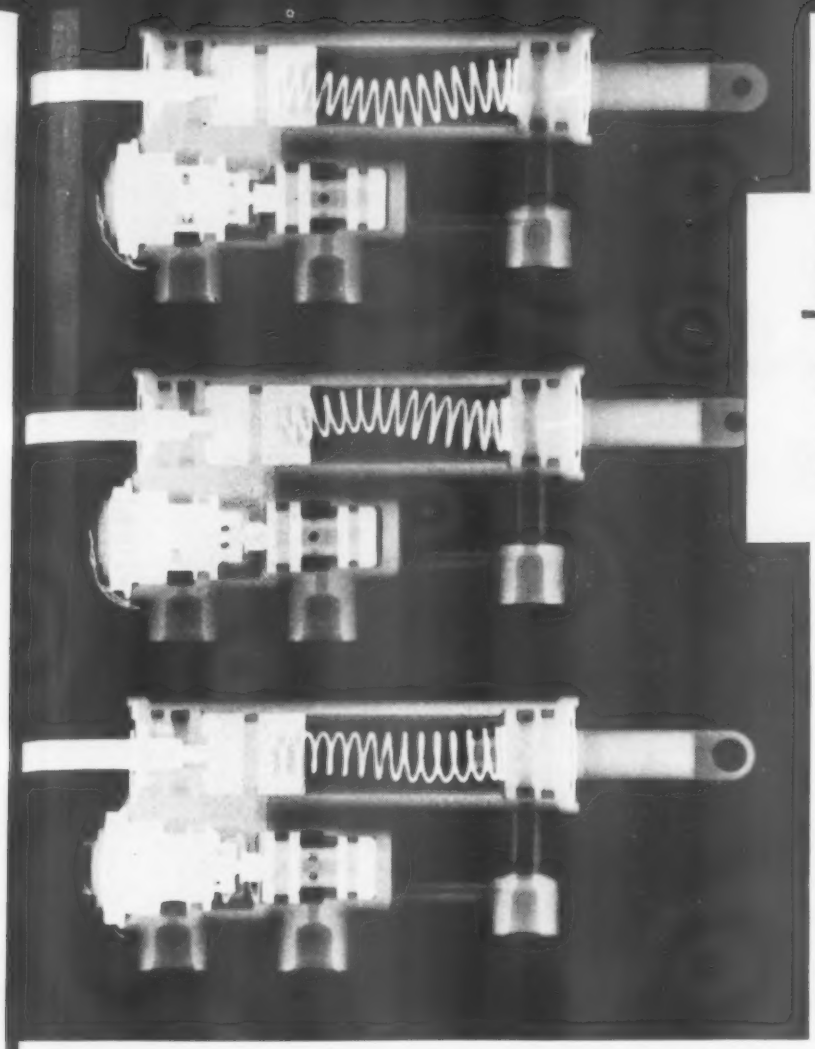
	Shipments Total	Shipments For Sale	Unfilled *Orders
1948			
Total	8,214	7,488	....
1949			
Apr.	726	669	3,234
May	778	726	2,885
June	799	759	3,025
July	689	637	3,073
Aug.	753	712	3,107
Sept.	727	691	3,015
Oct.	796	763	3,050
Nov.	801	769	2,399
Dec.	781	738	2,216
Total	9,364	8,781	....
1950			
Jan.	814	762	2,237
Feb.	735	676	2,218
Mar.	903	849	2,322
Apr.	799	751	2,305
May	810	762	2,282

* For sale only.

Aluminum

(Thousands of pounds)

	Shipments Total	Shipments Sand	Shipments Perm. Mold	Shipments Die	Unfilled *Orders
1948					
Total	424,490	139,781	161,334	118,738	.....
1949					
Apr.	23,801	8,041	8,353	6,876	45,638
May	21,392	7,582	7,293	5,994	41,460
June	23,261	8,668	7,790	6,257	38,159
July	18,621	6,311	6,592	5,180	36,993
Aug.	23,997	9,048	8,326	6,119	38,130
Sept.	27,546	9,923	9,491	7,623	38,179
Oct.	29,071	9,634	9,923	8,908	37,881
Nov.	26,317	9,212	8,315	8,348	36,846
Dec.	26,762	10,070	7,714	8,430	36,921
Total	304,616	106,825	102,908	88,019	.....
1950					
Jan.	28,801	9,646	9,400	9,052	40,591
Feb.	28,887	10,171	9,358	8,851	44,235
Mar.	35,845	13,035	11,094	10,870	47,350
Apr.	33,356	11,091	10,656	10,795	49,952
May	36,031	11,526	11,928	11,799	52,580

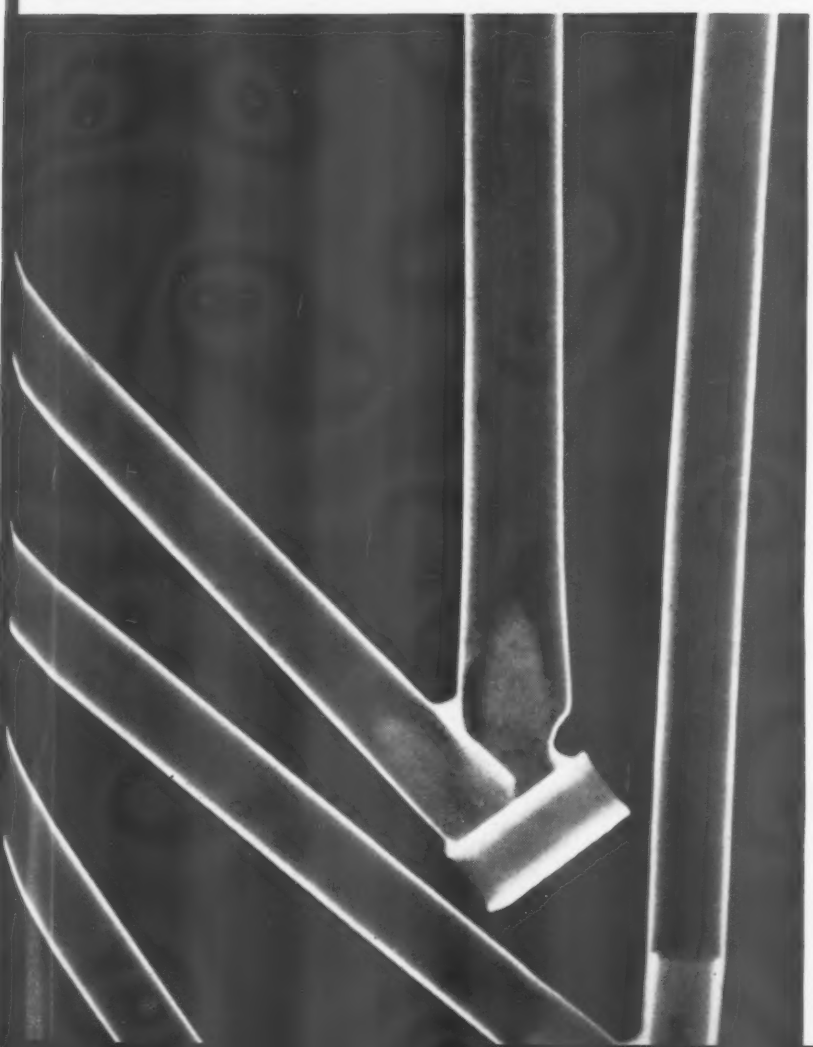


RADIOGRAPHY

goes beyond inspection of castings and welds

CHECKS ASSEMBLIES

Two of a group of hydraulic cylinders failed to function. Disassembly would have taken too long and involved breaking seals. Radiography compared the two with a good cylinder and revealed not only the compression springs rubbing on cylinder walls but also the absence of a second coil spring in the valve assemblies.



EXAMINES ENCLOSED SURFACES

Even though treated and sealed, these landing gear struts of an amphibian plane can develop internal corrosion and become weakened. Radiography alone can provide an examination of these internal surfaces. So the manufacturer has made it routine in the periodic inspection for service and safety of its amphibians.

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X-Ray Division, Rochester 4, N. Y.

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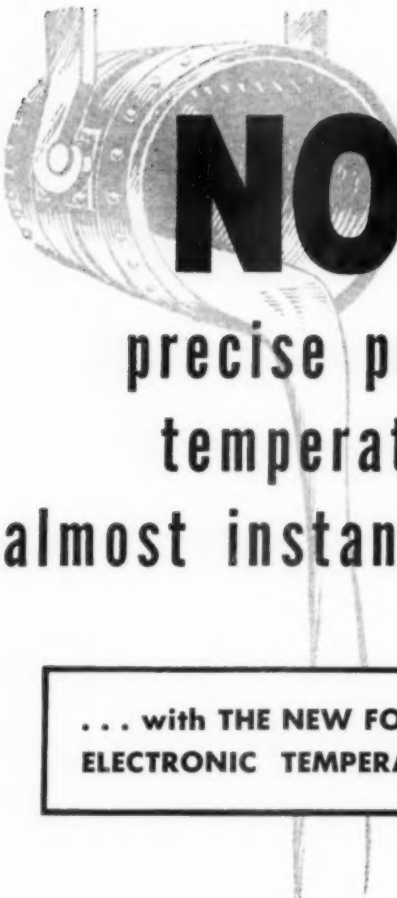

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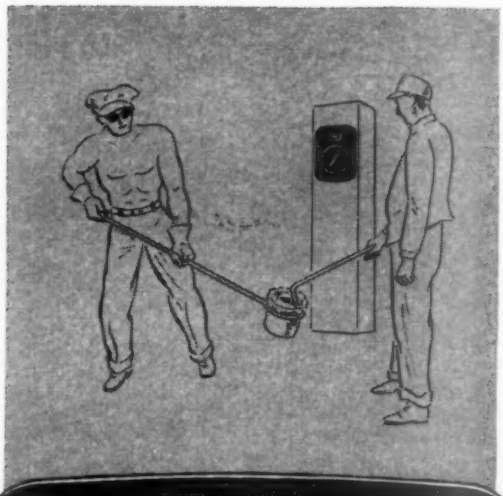

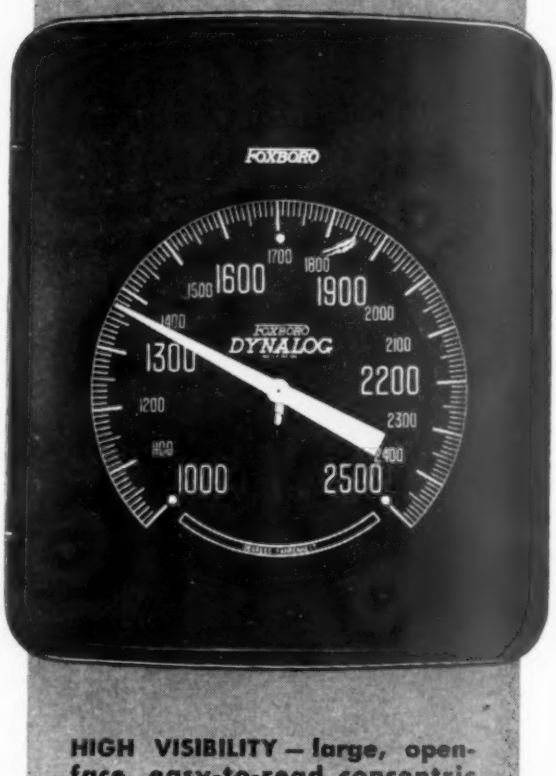

Here's an instrument so fast that immersion time for thermocouples in non-ferrous metals can be cut to an absolute minimum! It gives exact temperature measurements *instantly* . . . reduces possibility of metal-chilling in the ladle . . . *saves frequent thermocouple replacements.*

The first industrial instruments that take full advantage of electronic circuits, Dynalog Instruments have fewer moving parts . . . fewer parts to wear or get out of order. They have no slidewire, no galvanometer, no gears or cables, no batteries to standardize. Simple, rugged, and dependable, they practically eliminate maintenance. For speed, accuracy, sensitivity and simplicity combined, they have no equal.

Consider the advantages of the Dynalog Concentric Indicator as a means of getting better castings and greater foundry output. Examine the instrument from every angle . . . performance records . . . convenience . . . service-life. Write for complete information now. **The Foxboro Company, 32 Neponset Ave., Foxboro, Mass., U.S.A.**

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HIGH ACCURACY — Calibration accuracy ¼ of 1% of scale for all normal ranges . . . a direct result of the unique capacitor circuit.

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OBITUARY

HENRY F. Pope, 82, former president and board chairman, National Malleable & Steel Castings Co., Cleveland, died at his home there July 28. Mr. Pope was born in Cleveland and had been active in the company since he began as office boy with its predecessor, Cleveland Malleable Iron Co., in 1884. When the company was reorganized in 1891 as National Malleable Castings Co., he was named assistant treasurer, later serving as vice president. He assumed the presidency on the death

HENRY F. POPE

of his uncle, Alfred A. Pope, and in 1923 reorganized the concern as National Malleable & Steel Castings Co. Mr. Pope was chairman of the board of directors from 1934 until his retirement in 1945.

* * *

George A. Lewis, 70, formerly service inspector of aluminum castings at the Fairfield, Conn., plant of Aluminum Co. of America, Pittsburgh, died July 11, at his home in Cassadaga, Fla., where he had lived since his retirement in 1946. A native of Oxford, England, Mr. Lewis studied metallurgy at St. John's College there and came to the United States in 1910. He joined the Alcoa Fairfield plant in 1919.

* * *

Harry R. Hind, 57, vice president-general manager, Frederic B. Stevens of Canada Ltd., Windsor and Toronto, Ont., died recently. He had been associated with the company for 40 years.

* * *

Walter G. Quayle, 66, formerly foundry superintendent, Erie Malleable Iron Co., Erie, Pa., died there July 14. Mr. Quayle, a native of Cleveland, was associated with National Malleable & Steel Castings Co., Cleveland, and spent 25 years as

(*Continued on page* 162)

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Your HQ For These Foundry Specialties.....

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Foundries doing precision investment casting work look to Chicago Wheel for every requirement in abrasive mounted wheels, cut-off wheels and grinding wheels. You'll find them available in a wide range of shapes, sizes and specifications . . . backed by years of experience in de-burring precision castings.

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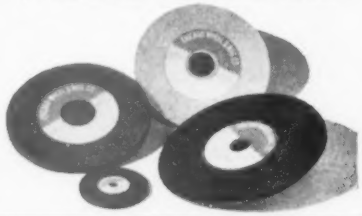
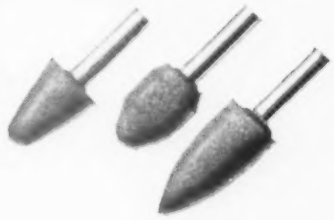


CLEANING AND BURRING ROOMS

For your cleaning and burring operations, look to Chicago Wheel—first and finest in mounted wheels and cones, both Vitrified and Resinoid. Here you get a custom-built product, including every grain, grade and shape of specified structural density to fulfill the most exacting requirements. Keep production up, costs down . . . with Chicago Wheels.



PATTERN ROOMS

HANDEE, the Tool of 1001 Uses, is ideally suited for your touch-up work and smoothing of patterns. For the small jobs and in hard-to-get-at places, you cannot beat the DeLuxe HANDEE. For the heavier jobs, there is the sensational new HANDEE "85." Over 500 accessories to save you valuable time and money.

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Valuable grinding information for your plant! These two booklets, "Safe Speeds For Grinding Wheels," and "Portable Grinding Machines," give your operators, supervisors and others plenty of practical grinding tips. Write today for your plant copies. No obligation.

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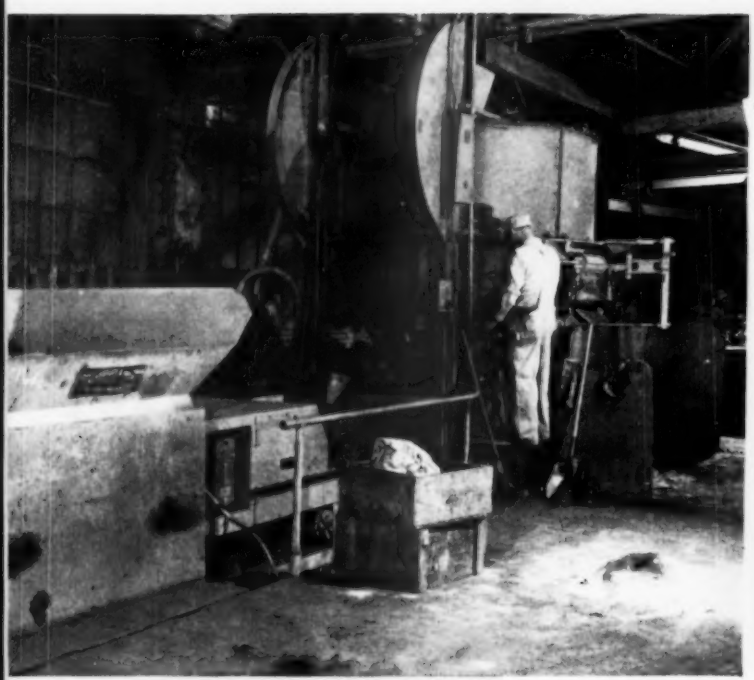

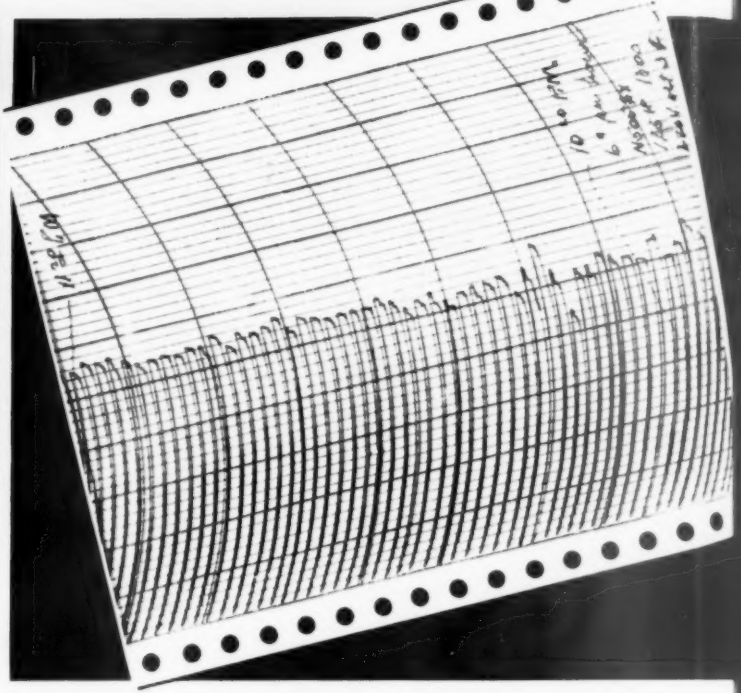

AT DALTON FOUNDRY, WARSAW, IND.: Dalton depends on two Speedmullor-Preparator units for complete conditioning and mulling . . . one in their gray iron and one in their malleable foundry. Each unit is operated about three hours each night and each prepares approximately 125 tons of sand during this time. Total cycle time for each batch of synthetic all-purpose molding sand is 72 seconds, and the watt-hour meter record above shows a typical hour's operation on one of the units during which 50 batches were prepared—50 batches totaling 1150 cu. ft.—in one hour.

Now, without the installation of expensive continuous sand systems, foundries everywhere are offered all of the advantages of complete sand conditioning and mulling. These advantages include lowered material and labor costs, improved sand quality, higher productivity per molder, and improved casting quality. Speedmullor-Preparator units offer capacities of seven to seventy tons an hour, and are adaptable to a wide range of foundry conditions. Their moderate cost makes these units outstanding sand conditioning investments! It pays to investigate —write today for more information.

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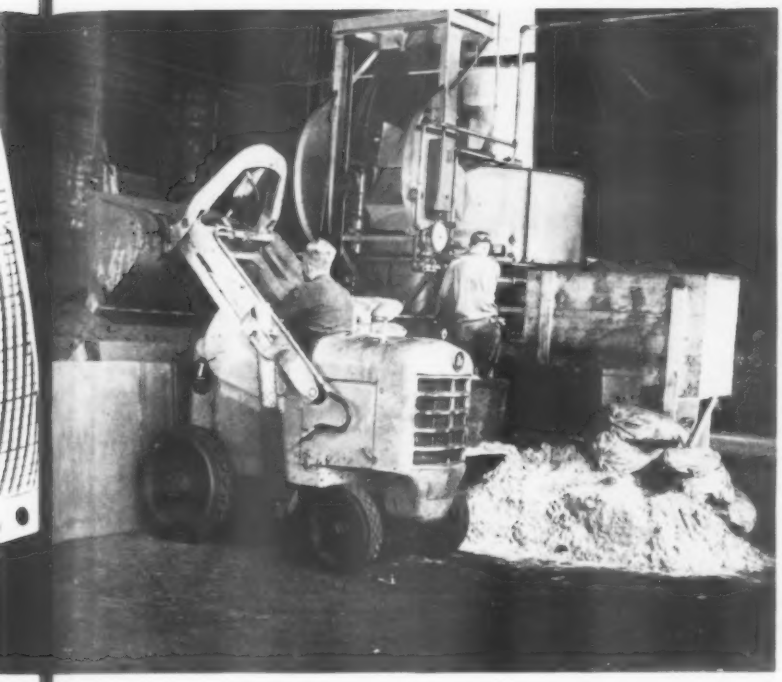
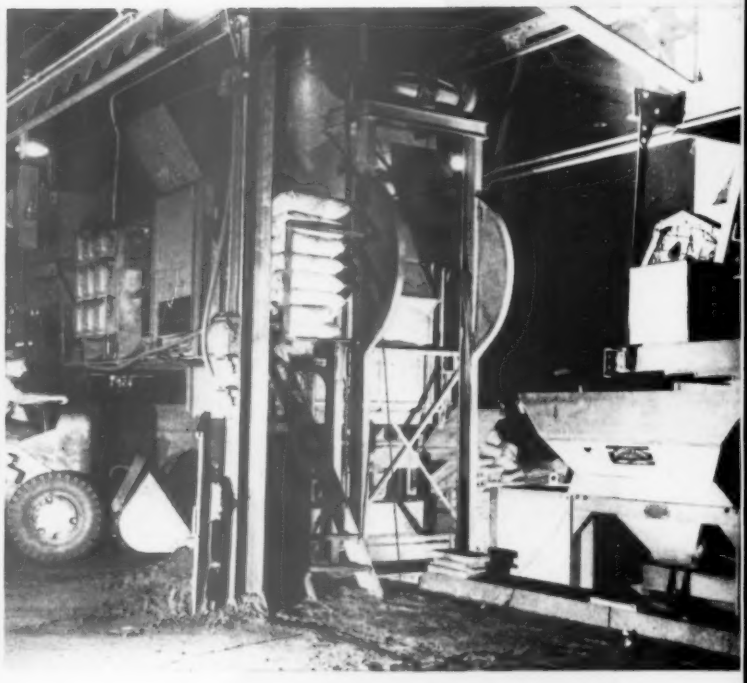
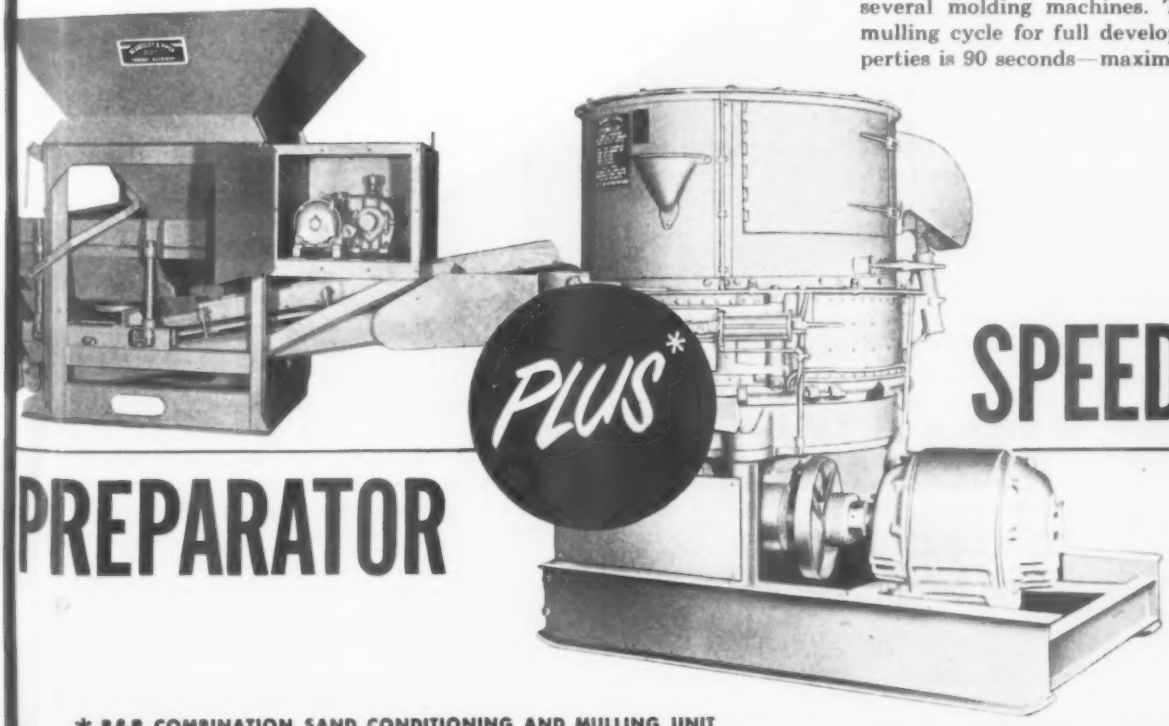




AT FREMONT FOUNDRY, FREMONT, OHIO: Two Speedmullor-Preparator units completely condition and mull all of the molding sand used in the foundry. The operation of the first unit was so satisfactory that the second unit was ordered six weeks after the installation of the first. The results: better sand, improved casting quality and reduced material and labor costs.

AT HANSELL ELCOCK, CHICAGO: A Speedmullor-Preparator unit completely conditions and mulls the foundry's total requirement of 250 tons of synthetic molding sand each eight hour day. The mullor has two discharge doors . . . prepared sand is discharged through one door into the Motive Speedslinger's spare tank, or through the other door into a pile from which a front end loader carries it to several molding machines. The total conditioning-mulling cycle for full development of physical properties is 90 seconds—maximum.



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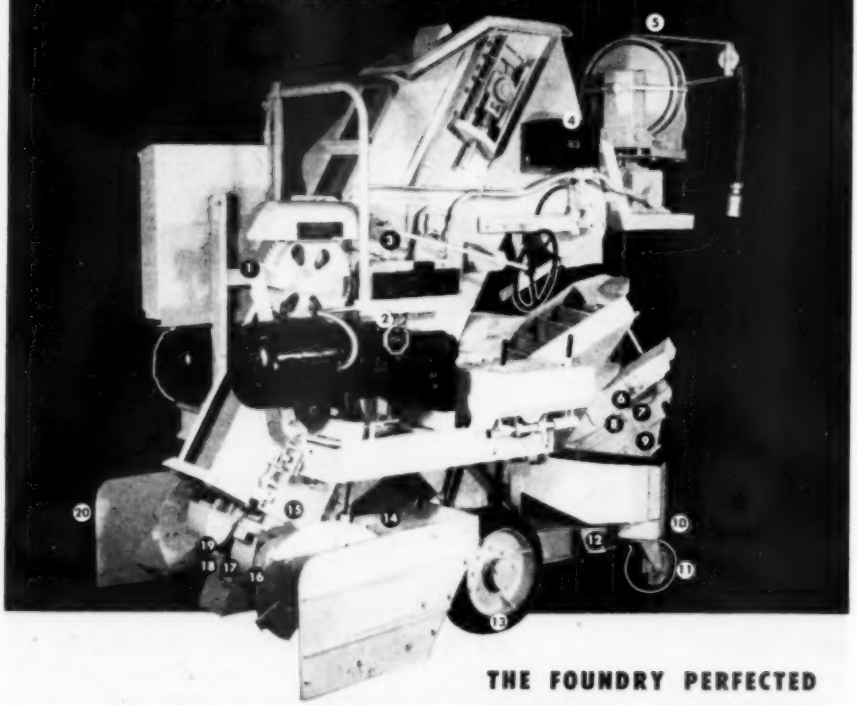
* B&P COMBINATION SAND CONDITIONING AND MULLING UNIT

Economically and Completely

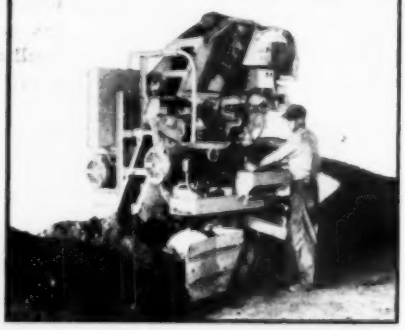
HOW TO RECONDITION SAND ON THE FLOOR AFTER SHAKEOUT!

Get up to *50 tons per hour* of *completely* conditioned sand with the new, improved Nite-Gang! It self propels, self loads, blends, magnetically separates, breaks lumps, thoroughly screens, double aerates and windrows or piles. The Nite-Gang increases molders' productivity and lowers molding costs!



THE FOUNDRY PERFECTED

NITE-GANG



...20 MAJOR IMPROVEMENTS!

1 Greater degree of tilting—lower travel height. **2** Increased range of loading and travel speed. **3** Centralized lubrication for conveyor bearings. **4** Selenium Rectifier—no warm-up period—no tubes. **5** Swivel mounted cable reel—automatic rewind—290° rotation. **6** Hard surfaced paddle holder. **7** High alloy-hardened Screenarator liner. **8** Large Aerator—18" diameter. **9** Larger Screenarator motor—7½ h.p. **10** Shorter overall length—greater maneuverability. **11** Sealed-bearing casters. **12** Improved Screenarator turntable—240° rotation. **13** Solid cushion rubber tires. **14** Improved plow design. **15** Spring loaded screw conveyor and elevator. **16** Double sealed, self aligning, roller bearings. **17** Sand deflectors ahead of bearings. **18** Hardened high alloy two piece sprockets. **19** Hardened elevator chain bushings. **20** Choice of plow width—5 ft. or 6 ft.

The improved Nite-Gang will provide you with more and better conditioned sand at low cost! Write today for your copy of the new Nite-Gang bulletin!

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(*Continued from page* 159)

plant manager of Eberhard Mfg. Co. there. More recently he had been foundry superintendent of Erie Malleable Iron Co., until his retirement early this year.

* * *

Col. Garrit C. DeHeus, 67, sinoe February, 1946 executive vice president, Chicago Foundrymen's Association, died in Chicago Aug. 3. Col. DeHeus, a native of Wisconsin, attained his military rank in World War I. He served as state procurement officer of the Selective Service System in Wisconsin and later as executive officer of the War Production Board, Chicago, during World War II.

* * *

Nathan Lester, 66, president of the Lester Engineering Co. and Lester-Phoenix Inc., Cleveland, died at his home there June 10. Mr. Lester was associated with the die casting and injection molding fields for over 40 years. His early training as a toolmaker led him to designing machinery and in 1935 the two companies which bear his name were organized.

* * *

LeRoy E. Gruett, 44, supervisor of the experimental engineering laboratory, Falk Corp., Milwaukee, died June 19. Mr. Gruett had been associated with the company 27 years.

* * *

William H. Hogue, 73, retired manager for the former Magnus Brass Foundry Co., Houston, Tex., now a division of National Lead Co., New York, died July 10.

* * *

Earl P. Disbro, 66, president, W. S. Tyler Co., Cleveland, died there July 29. Mr. Disbro had been associated with the company for over 50 years.

* * *

Charles C. Bacon, 75, retired director and secretary, Ross-Tacony Crucible Co., Philadelphia, died there July 23.

* * *

William C. Whyte, 62, vice president, Electro Alloys Division, American Brake Shoe Co., Elyria, O., died June 23.

* * *

Thomas J. McDermott, 84, formerly associated with St. Louis Malleable Casting Co., St. Louis, Mo., died July 21.

* * *

Thomas Bellsnyder, 65 founder and president, Jefferson Foundry Co., Birmingham, died recently.

* * *

Jules Mathews, 86, sales representative, SPO Inc., Cleveland, manufacturers of foundry equipment, died July 10. Mr. Mathews was born in

Belgium, served his foundry apprenticeship in Russia and worked in foundries there and in France before coming to United States in 1899. For many years he operated his own foundry in Cleveland, the Mathews Steel Castings Co., and in recent years sold foundry equipment.

Slide Films Boost Free Enterprise

An economic education sound slide film program has been developed by Ross Roy Inc., Dept. Y, 2751 East Jefferson Ave., Detroit, to help American businessmen sell the benefits of America's economic system. In a series of six slide films, the program tells the story of man's fight for economic freedom from prehistoric days to the present.

The program involves a typical American family headed by Tom Smith, a typical American worker. The lessons of history are brought home to him and to the "Tom Smiths" in the audience.

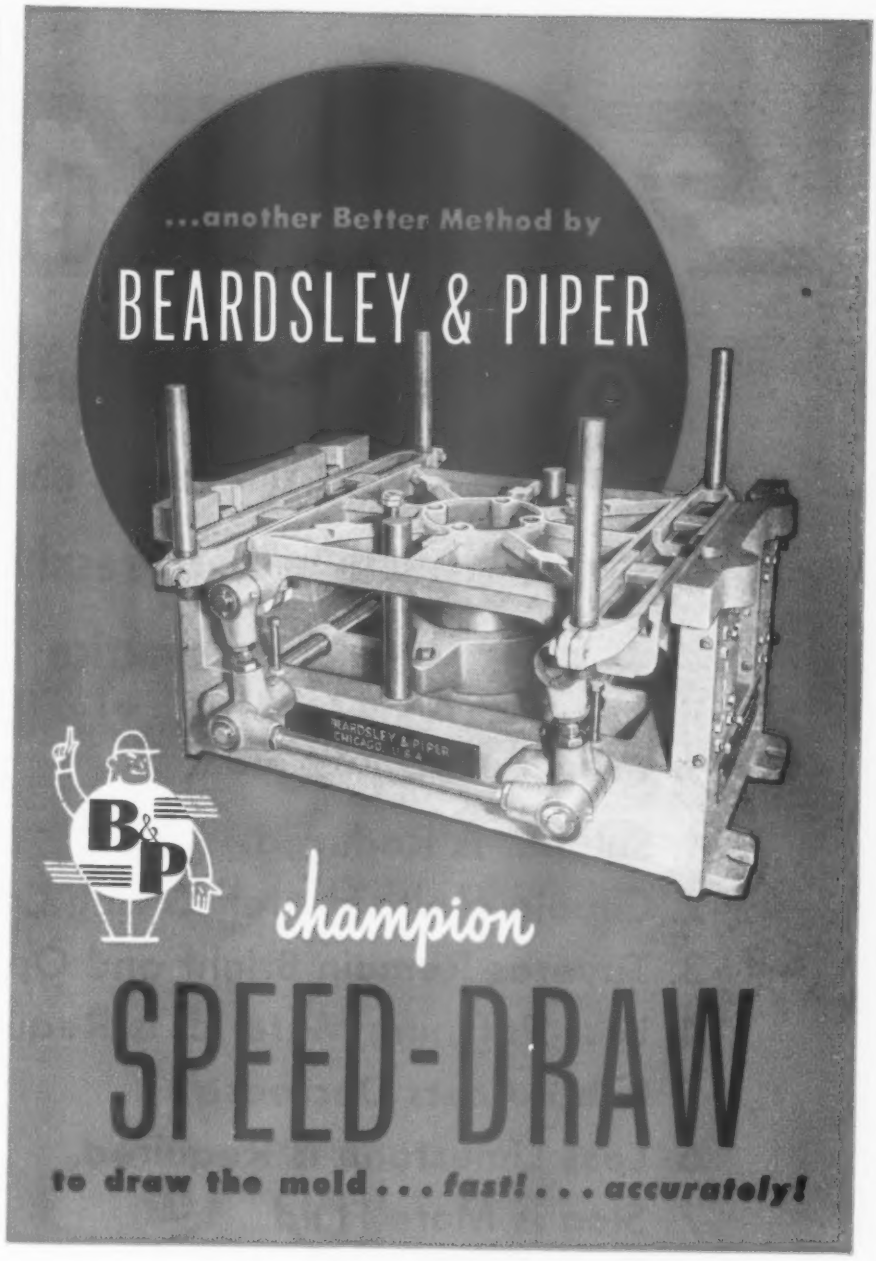
It is acceptable to all groups. No part of the program talks "party politics." It uses history to sell Americans an appreciation of fundamental economic freedom. History proves that whenever people lose economic freedom, they also lose all human freedoms.

Termed the "Land of the Free" program, it has the one purpose of showing what our economic freedom means to us, how it works for us, and what will happen if we lose it. Entire program is sold in package form, six films and six records with 25 booklets on each film.

Book Review

Sales Engineering, by Bernard Lester, cloth, 226 pages, 5½ x 9¾ in., published by John Wiley & Sons, New York. Price $3.

Increasing importance of the sales engineer in furthering the mechanization of industry is well recognized. Because the ability to create orders depends upon a thorough understanding of selling procedures basic in any industry, this book should be of assistance both to the younger technically trained engineers and to the many men engaged in selling or supervising the distribution of industrial equipment. The book is chiefly concerned with the art of selling equipment and services that require engineering skill in selection, application and use. The second edition has been enlarged by about 10 per cent to cover the subject more completely and to include suggestions made by users of the first edition.



The air operated, Champion Speed-Draw lifts either cope or drag mold quickly, smoothly, and economically. Pattern mounting is simplified and pattern changes are made with a minimum of interruption to production.

There are eleven Champion Speed-Draw Models—both stationary and portable — to cover a maximum range of flask sizes. Adjustable lifting pin brackets permit the use of a wide range of flask sizes on each model. Get complete information on the Speed-Draw now!

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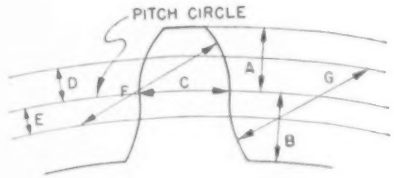
INFORMATION ON LAYING OUT EPICYCLOIDAL GEAR TEETH



A = 0.3 x pitch = distance between the pitch and addendum circles.

B = 0.375 x pitch = distance between pitch and root circles.

C = 0.466 x pitch = thickness of gear tooth.

D = distance from pitch circle to line of flank centers.

E = distance from pitch circle to radius base line.

F = face radius of gear tooth.

G = flank radius of gear tooth.

Table I

Values for Layout of 12-Tooth Gear

Pitch	A	B	C	D*	E	F	G*
½	5/32	3/16	15/64		1/64	1/16	
¾	7/32	9/32	11/32		1/64	1/64	
1	5/16	3/8	15/32		1/32	1/16	
1⅛	11/32	27/64	17/32		1/32	3/32	
1¼	3/8	15/32	31/64		1/32	1/16	
1⅜	13/32	33/64	19/32		1/32	3/32	
1½	7/16	9/16	21/32		1/32	1/16	
1⅝	½	5/8	3/4		1/32	1/64	
1¾	17/32	21/32	13/16		1/32	1/32	
1⅞	9/16	11/16	7/8		1/32	1/16	
2	19/32	3/4	15/16		1/64	1/32	
2¼	11/16	27/32	1 1/16		1/64	1/16	
2½	3/4	15/16	1 5/32		1/64	1/32	
2¾	13/16	1 1/32	1 9/32		1/64	1/32	
3	29/32	1⅛	1 13/32		1/16	1/32	
3¼	31/32	1 7/32	1 33/64		1/16	2/64	
3½	1 1/64	1 5/16	1⅝		1/16	2¼	
4	1 11/64	1½	1 25/64		1/64	2 2/16	

Table II

Values for Layout of 13-14-Tooth Gear

Pitch	A	B	C	D	E	F	G
½	5/32	3/16	15/64	1½	1/64	3/8	2 13/32
¾	7/32	9/32	11/32	2¼	1/64	½	3 5/8
1	5/16	3/8	15/32	3	1/32	5/16	4 13/16
1⅛	11/32	27/64	17/32	3 3/8	1/32	¾	5 13/32
1¼	3/8	15/32	31/64	3 3/4	1/32	13/32	6
1⅜	13/32	33/64	19/32	4 1/8	1/32	29/32	6 5/8
1½	7/16	9/16	21/32	4½	1/32	31/32	7 13/32
1⅝	½	5/8	¾	4 7/8	1/32	1 1/16	7 5/8
1¾	17/32	21/32	13/16	5¼	1/32	1 1/32	8 13/32
1⅞	9/16	11/16	7/8	5 5/8	1/64	1 13/32	9
2	19/32	¾	15/16	6	1/64	1 5/16	9 5/8
2¼	11/16	27/32	1 1/16	6 3/4	1/64	1 13/32	10 13/16
2½	¾	15/16	1 5/32	7½	1/64	1 5/8	12
2¾	13/16	1 1/32	1 9/32	8¼	1/64	1 25/32	13 3/32
3	29/32	1⅛	1 13/32	9	1/16	1 31/32	14 13/32
3¼	31/32	1 7/32	1 33/64	9 3/4	1/16	2 1/8	15 5/8
3½	1 1/64	1 5/16	1 5/8	10½	1/16	2 5/32	16 13/32
4	1 11/64	1½	1 25/64	12	1/64	2 25/64	19 5/16

*In this chart for 12 teeth only, the dimensions D and G are omitted as the flanks may be formed with sufficient accuracy from the radii given for the face.

Table III

Values for Layout of 15-16-Tooth Gear

Pitch	A	B	C	D	E	F	G
½	5/32	3/16	15/64	0	1/64	11/32	1¼
¾	7/32	9/32	11/32	1/64	1/32	½	1 7/8
1	5/16	3/8	15/32	1 3/64	1/32	43/64	2½
1⅛	11/32	27/64	17/32	1 1/16	1/32	¾	2 13/16
1¼	3/8	15/32	31/64	1 3/8	1/32	53/64	3 1/8
1⅜	13/32	33/64	19/32	1 23/64	1/64	7/8	3 1/16
1½	7/16	9/16	11/16	1 31/32	3/64	1	3 3/4
1⅝	½	5/8	¾	1 1/32	1/64	1 1/32	4 1/16
1¾	17/32	21/32	13/16	1 1/16	1/16	1 11/64	4 3/8
1⅞	9/16	11/16	7/8	2 1/16	1/16	1¼	4 11/16
2	19/32	¾	15/16	2 1/8	1/16	1 1/32	5
2¼	11/16	27/32	1 1/16	2 3/16	1/16	1½	5 5/8
2½	¾	15/16	1 5/32	2 3/4	1/64	1 31/64	6 1/4
2¾	13/16	1 1/32	1 9/32	3 1/32	1/64	1 15/32	6 7/8
3	29/32	1⅛	1 13/32	3 5/16	1/32	2 1/64	7½
3¼	31/32	1 7/32	1 33/64	3 5/8	1/64	2 3/16	8 1/8
3½	1 1/64	1 5/16	1 5/8	3 7/8	1/64	2 1/32	8 3/4
4	1 11/64	1½	1 25/64	4 13/32	1/8	2 1/16	10

Table IV

Values for Layout of 17-18-Tooth Gear

Pitch	A	B	C	D	E	F	G
½	5/32	13/64	15/32	23/64	1/64	11/32	31/64
¾	7/32	9/32	11/32	17/32	1/32	33/64	1 13/32
1	5/16	3/8	15/32	1 7/64	1/32	11/16	1 31/64
1⅛	11/32	27/64	17/32	1 13/32	1/32	49/64	2 1/16
1¼	3/8	15/32	31/64	1 7/8	1/32	55/64	2 7/16
1⅜	13/32	33/64	19/32	2 5/64	1/32	1/16	2 13/16
1½	7/16	9/16	11/16	1 15/16	1/16	1 1/32	2 15/16
1⅝	½	5/8	¾	1 11/16	1/16	1 1/64	3 3/64
1¾	17/32	21/32	13/16	1 1/32	1/64	1 1/8	3 7/16
1⅞	9/16	11/16	7/8	1 1/16	1/64	1¼	3 13/16
2	19/32	¾	15/16	1 13/64	1/64	1 33/64	3 31/32
2¼	11/16	27/32	1 1/16	1 29/64	1/32	1 15/32	4 11/32
2½	¾	15/16	1 5/32	1 3/4	1/64	1 31/64	4 7/8
2¾	13/16	1 1/32	1 9/32	1 29/32	1/64	1 7/8	5 3/8
3	29/32	1⅛	1 13/32	2 3/64	1/8	2 3/64	5 31/32
3¼	31/32	1 7/32	1 33/64	2 5/32	1/8	2 3/4	6 13/32
3½	1 1/64	1 5/16	1 5/8	2 9/64	1/64	2 3/8	6 23/32
4	1 11/64	1½	1 25/64	2 13/32	3/32	2 25/32	7 13/16

Table V

Values for Layout of 19-21-Tooth Gear

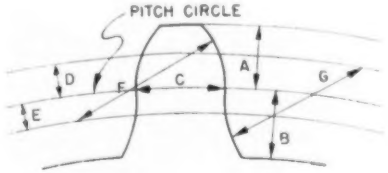
Pitch	A	B	C	D	E	F	G
½	5/32	3/16	15/64	1/4	1/64	23/64	13/32
¾	7/32	9/32	11/32	3/8	1/32	1 7/32	
1	5/16	3/8	15/32	3/4	1/32	15/16	
1⅛	11/32	27/64	17/32	1 1/16	1/32	1 15/32	
1¼	3/8	15/32	31/64	1 5/16	1/32	1 23/32	
1⅜	13/32	33/64	19/32	1 9/16	1/32	1 31/32	
1½	7/16	9/16	11/16	1 13/16	1/32	2 7/32	
1⅝	½	5/8	¾	2 1/16	1/32	2 15/32	
1¾	17/32	21/32	13/16	2 5/16	1/32	2 23/32	
1⅞	9/16	11/16	7/8	2 9/16	1/32	2 31/32	
2	19/32	¾	15/16	2 13/16	1/64	3 1/32	
2¼	11/16	27/32	1 1/16	3 3/16	1/64	3 9/32	
2½	¾	15/16	1 5/32	3 9/16	1/64	3 17/32	
2¾	13/16	1 1/32	1 9/32	3 15/16	1/64	3 25/32	
3	29/32	1⅛	1 13/32	4 3/8	1/64	4 1/32	
3¼	31/32	1 7/32	1 33/64	4 13/16	1/64	4 9/32	
3½	1 1/64	1 5/16	1 5/8	5 1/4	1/64	4 17/32	
4	1 11/64	1½	1 25/64	5 3/4	1/64	4 25/32	

Table VI

Values for Layout of 22-24-Tooth Gear

Pitch	A	B	C	D	E	F	G
½	5/32	3/16	15/64	3/8	1/32	29/64	29/32
¾	7/32	9/32	11/32	9/16	1/32	43/64	1 45/64
1	5/16	3/8	15/32	23/64	1/64	59/64	1 7/16
1⅛	11/32	27/64	17/32	13/16	1/64	1 3/64	1 13/16
1¼	3/8	15/32	31/64	1 7/32	1/64	1 11/64	2 3/16
1⅜	13/32	33/64	19/32	1 15/32	1/64	1 19/64	2 9/16
1½	7/16	9/16	11/16	1 21/32	1/64	1 27/64	2 15/16
1⅝	½	5/8	¾	1 29/32	1/64	1 35/64	3 3/8
1¾	17/32	21/32	13/16	2 1/32	1/64	1 43/64	3 13/16
1⅞	9/16	11/16	7/8	2 5/32	1/64	1 51/64	4 1/4
2	19/32	¾	15/16	2 11/32	1/64	1 59/64	4 11/16
2¼	11/16	27/32	1 1/16	2 25/32	1/64	2 15/64	5 5/8
2½	¾	15/16	1 5/32	3 7/32	1/64	2 31/64	6 9/16
2¾	13/16	1 1/32	1 9/32	3 21/32	1/64	2 47/64	7 1/2
3	29/32	1⅛	1 13/32	4 5/32	1/64	2 63/64	8 7/16
3¼	31/32	1 7/32	1 33/64	4 11/16	1/64	3 9/32	9 3/8
3½	1 1/64	1 5/16	1 5/8	5 3/16	1/64	3 25/32	10 5/16
4	1 11/64	1½	1 25/64	5 29/32	1/64	4 1/32	11 1/4

INFORMATION ON LAYING OUT EPICYCLOIDAL GEAR TEETH



A = 0.3 x pitch = distance between the pitch and addendum circles.

B = 0.375 x pitch = distance between pitch and root circles.

C = 0.466 x pitch = thickness of gear tooth.

D = distance from pitch circle to line of flank centers.

E = distance from pitch circle to radius base line.

F = face radius of gear tooth.

G = flank radius of gear tooth.

Table VII

Values for Layout of 25-29-Tooth Gear

Pitch	A	B	C	D	E	F	G
½	5/32	5/16	15/32	3/16	1/32	3/8	31/32
¾	7/32	9/32	11/32	3/32	3/32	1/16	31/32
1	5/16	3/8	15/32	3/16	1/16	3/4	1 15/16
1 1/8	11/32	27/64	17/32	3/32	3/32	1/32	1 23/32
1 1/4	3/8	45/128	19/32	3/32	1/16	1/16	1 15/16
1 3/8	13/32	31/64	21/32	1/32	1/16	1 1/64	1 31/32
1 1/2	7/16	9/16	11/16	1/16	1/16	1 1/64	1 31/32
1 5/8	1/2	5/8	3/4	1/32	1/32	1 1/32	2 1/64
1 3/4	17/32	43/64	13/16	1/32	1/32	1 1/32	2 1/32
1 7/8	9/16	45/64	7/8	1/32	1/32	1 1/32	2 1/16
2	19/32	3/4	15/16	1/32	1/32	1 1/32	2 1/16
2 1/4	43/64	51/64	1 1/64	1/32	1/32	1 1/32	2 1/16
2 1/2	3/4	15/16	1 1/32	1/32	1/32	1 1/32	2 1/16
2 3/4	47/64	1 3/32	1 3/32	1/32	1/32	1 1/32	2 1/16
3	25/32	1 1/8	1 3/32	1/32	1/32	1 1/32	2 1/16
3 1/4	51/64	1 5/32	1 7/32	1/32	1/32	1 1/32	2 1/16
3 1/2	1 1/64	1 1/16	1 5/32	1/32	1/32	1 1/32	2 1/16
4	1 13/64	1 1/2	1 9/32	1/32	1/32	1 1/32	2 1/16

Table VIII

Values for Layout of 30-36-Tooth Gear

Pitch	A	B	C	D	E	F	G
½	5/32	5/16	15/32	3/16	1/32	3/8	31/32
¾	7/32	9/32	11/32	3/32	3/32	1/16	31/32
1	5/16	3/8	15/32	3/16	1/16	3/4	1 15/16
1 1/8	11/32	27/64	17/32	3/32	3/32	1/32	1 23/32
1 1/4	3/8	45/128	19/32	3/32	1/16	1/16	1 15/16
1 3/8	13/32	31/64	21/32	1/32	1/16	1 1/64	1 31/32
1 1/2	7/16	9/16	11/16	1/16	1/16	1 1/64	1 31/32
1 5/8	1/2	5/8	3/4	1/32	1/32	1 1/32	2 1/64
1 3/4	17/32	43/64	13/16	1/32	1/32	1 1/32	2 1/32
1 7/8	9/16	45/64	7/8	1/32	1/32	1 1/32	2 1/16
2	19/32	3/4	15/16	1/32	1/32	1 1/32	2 1/16
2 1/4	43/64	51/64	1 1/64	1/32	1/32	1 1/32	2 1/16
2 1/2	3/4	15/16	1 1/32	1/32	1/32	1 1/32	2 1/16
2 3/4	47/64	1 3/32	1 3/32	1/32	1/32	1 1/32	2 1/16
3	25/32	1 1/8	1 3/32	1/32	1/32	1 1/32	2 1/16
3 1/4	51/64	1 5/32	1 7/32	1/32	1/32	1 1/32	2 1/16
3 1/2	1 1/64	1 1/16	1 5/32	1/32	1/32	1 1/32	2 1/16
4	1 13/64	1 1/2	1 9/32	1/32	1/32	1 1/32	2 1/16

*The dimensions here given may be used for any gear with 145 or more teeth or for a straight rack.

Table IX

Values for Layout of 37-38-Tooth Gear

Pitch	A	B	C	D	E	F	G
½	5/32	5/16	15/32	3/16	1/32	3/8	31/32
¾	7/32	9/32	11/32	3/32	3/32	1/16	31/32
1	5/16	3/8	15/32	3/16	1/16	3/4	1 15/16
1 1/8	11/32	27/64	17/32	3/32	3/32	1/32	1 23/32
1 1/4	3/8	45/128	19/32	3/32	1/16	1/16	1 15/16
1 3/8	13/32	31/64	21/32	1/32	1/16	1 1/64	1 31/32
1 1/2	7/16	9/16	11/16	1/16	1/16	1 1/64	1 31/32
1 5/8	1/2	5/8	3/4	1/32	1/32	1 1/32	2 1/64
1 3/4	17/32	43/64	13/16	1/32	1/32	1 1/32	2 1/32
1 7/8	9/16	45/64	7/8	1/32	1/32	1 1/32	2 1/16
2	19/32	3/4	15/16	1/32	1/32	1 1/32	2 1/16
2 1/4	43/64	51/64	1 1/64	1/32	1/32	1 1/32	2 1/16
2 1/2	3/4	15/16	1 1/32	1/32	1/32	1 1/32	2 1/16
2 3/4	47/64	1 3/32	1 3/32	1/32	1/32	1 1/32	2 1/16
3	25/32	1 1/8	1 3/32	1/32	1/32	1 1/32	2 1/16
3 1/4	51/64	1 5/32	1 7/32	1/32	1/32	1 1/32	2 1/16
3 1/2	1 1/64	1 1/16	1 5/32	1/32	1/32	1 1/32	2 1/16
4	1 13/64	1 1/2	1 9/32	1/32	1/32	1 1/32	2 1/16

Table X

Values for Layout of 49-72-Tooth Gear

Pitch	A	B	C	D	E	F	G
½	5/32	5/16	15/32	3/16	1/32	3/8	31/32
¾	7/32	9/32	11/32	3/32	3/32	1/16	31/32
1	5/16	3/8	15/32	3/16	1/16	3/4	1 15/16
1 1/8	11/32	27/64	17/32	3/32	3/32	1/32	1 23/32
1 1/4	3/8	45/128	19/32	3/32	1/16	1/16	1 15/16
1 3/8	13/32	31/64	21/32	1/32	1/16	1 1/64	1 31/32
1 1/2	7/16	9/16	11/16	1/32	1/16	1 1/64	1 31/32
1 5/8	1/2	5/8	3/4	1/32	1/32	1 1/32	2 1/64
1 3/4	17/32	43/64	13/16	1/32	1/32	1 1/32	2 1/32
1 7/8	9/16	45/64	7/8	1/32	1/32	1 1/32	2 1/16
2	19/32	3/4	15/16	1/32	1/32	1 1/32	2 1/16
2 1/4	43/64	51/64	1 1/64	1/32	1/32	1 1/32	2 1/16
2 1/2	3/4	15/16	1 1/32	1/32	1/32	1 1/32	2 1/16
2 3/4	47/64	1 3/32	1 3/32	1/32	1/32	1 1/32	2 1/16
3	25/32	1 1/8	1 3/32	1/32	1/32	1 1/32	2 1/16
3 1/4	51/64	1 5/32	1 7/32	1/32	1/32	1 1/32	2 1/16
3 1/2	1 1/64	1 1/16	1 5/32	1/32	1/32	1 1/32	2 1/16
4	1 13/64	1 1/2	1 9/32	1/32	1/32	1 1/32	2 1/16

Table XI

Values for Layout of 73-144-Tooth Gear

Pitch	A	B	C	D	E	F	G
½	5/32	5/16	15/32	3/16	1/32	3/8	31/32
¾	7/32	9/32	11/32	3/32	3/32	1/16	31/32
1	5/16	3/8	15/32	3/16	1/16	3/4	1 15/16
1 1/8	11/32	27/64	17/32	3/32	3/32	1/32	1 23/32
1 1/4	3/8	45/128	19/32	3/32	1/16	1/16	1 15/16
1 3/8	13/32	31/64	21/32	1/32	1/16	1 1/64	1 31/32
1 1/2	7/16	9/16	11/16	1/32	1/16	1 1/64	1 31/32
1 5/8	1/2	5/8	3/4	1/32	1/32	1 1/32	2 1/64
1 3/4	17/32	43/64	13/16	1/32	1/32	1 1/32	2 1/32
1 7/8	9/16	45/64	7/8	1/32	1/32	1 1/32	2 1/16
2	19/32	3/4	15/16	1/32	1/32	1 1/32	2 1/16
2 1/4	43/64	51/64	1 1/64	1/32	1/32	1 1/32	2 1/16
2 1/2	3/4	15/16	1 1/32	1/32	1/32	1 1/32	2 1/16
2 3/4	47/64	1 3/32	1 3/32	1/32	1/32	1 1/32	2 1/16
3	25/32	1 1/8	1 3/32	1/32	1/32	1 1/32	2 1/16
3 1/4	51/64	1 5/32	1 7/32	1/32	1/32	1 1/32	2 1/16
3 1/2	1 1/64	1 1/16	1 5/32	1/32	1/32	1 1/32	2 1/16
4	1 13/64	1 1/2	1 9/32	1/32	1/32	1 1/32	2 1/16

Table XII

Values for Layout of 145-Tooth Gear or Rack*

Pitch	A	B	C	D	E	F	G
½	5/32	5/16	15/32	3/16	1/32	3/8	31/32
¾	7/32	9/32	11/32	3/32	3/32	1/16	31/32
1	5/16	3/8	15/32	3/16	1/16	3/4	1 15/16
1 1/8	11/32	27/64	17/32	3/32	3/32	1/32	1 23/32
1 1/4	3/8	45/128	19/32	3/32	1/16	1/16	1 15/16
1 3/8	13/32	31/64	21/32	1/32	1/16	1 1/64	1 31/32
1 1/2	7/16	9/16	11/16	1/32	1/16	1 1/64	1 31/32
1 5/8	1/2	5/8	3/4	1/32	1/32	1 1/32	2 1/64
1 3/4	17/32	43/64	13/16	1/32	1/32	1 1/32	2 1/32
1 7/8	9/16	45/64	7/8	1/32	1/32	1 1/32	2 1/16
2	19/32	3/4	15/16	1/32	1/32	1 1/32	2 1/16
2 1/4	43/64	51/64	1 1/64	1/32	1/32	1 1/32	2 1/16
2 1/2	3/4	15/16	1 1/32	1/32	1/32	1 1/32	2 1/16
2 3/4	47/64	1 3/32	1 3/32	1/32	1/32	1 1/32	2 1/16
3	25/32	1 1/8	1 3/32	1/32	1/32	1 1/32	2 1/16
3 1/4	51/64	1 5/32	1 7/32	1/32	1/32	1 1/32	2 1/16
3 1/2	1 1/64	1 1/16	1 5/32	1/32	1/32	1 1/32	2 1/16
4	1 13/64	1 1/2	1 9/32	1/32	1/32	1 1/32	2 1/16

DELCO 30 Series CORE OIL

is ready for use

without preconditioning

"We are producing grey iron, semi-steel and alloyed iron castings, ranging from 1¼ oz. to 2500 lbs. With the 36 Core Oil, the ratios vary but we use the same sand for all sizes of cores with a resulting uniform strength. Large castings can be poured with unsupported runner boxes.

With the 36 Core Oil, only water and cereal binder are used with the sand, and no other preparations are added. This oil is practically odorless and works good in either freezing or hot weather."

Nelson Electric Mfg. Co., Tulsa, Oklahoma

ALWAYS ready!

Whether it's hot or cold you'll find Delco 30 Series Core Oils are always ready for use without preconditioning. Read the following typical reports from leading Foundry users:

- "The big difference is in saving time and fuel in the oven by cutting down both time and temperature—with no sacrifice of results in the finished core."
- "Results indicated 30 Series Delco Core Oil best suited our general overall work."
- "Best Core Oil I ever used!"
- "We are using one-fifth less oil, and the baking time in the ovens has been reduced approximately two hours."

Why not investigate today the possibilities of this remarkable core oil in your foundry. Let our Cities Service representative give you prompt and valuable assistance in choosing and applying the correct grade for your requirements. Cities Service Oil Company, Chicago, Cleveland, Kansas City, St. Paul and Toronto; Arkansas Fuel Oil Company, Shreveport.

Outstanding Features of Cities Service 30 Series Core Oil:

BETTER PERFORMANCE in core boxes, whether blown or hand rammed, whether sand is washed and dried or crude.

FASTER DRYING TIME without recourse to older types of drying oils.

WIDE RANGE OF WORKING TEMPERATURE—ready for use without pre-conditioning, whether in Texas or Montreal.

BAKES OUT AT LOWER TEMPERATURE, saves time, oven capacity and fuel.

HAS A CLEAN, PLEASANT ODOR.

MADE IN FIVE QUALITY RANGES accommodating all local foundry and core room conditions.

DELCO CORE OILS • ROSINAL LIQUID CORE BINDER • DELCO CORE AND MOLD WASH

CITIES SERVICE

HAUSFELD FURNACES

FOR "ALL-OUT" PRODUCTION IN NON-FERROUS FOUNDRIES

Provide the Utmost in Speed Production and Safety

FURNACES FOR
BRASS • ALUMINUM • MAGNESIUM
AND ALL OTHER
NON-FERROUS ALLOYS

The Campbell-Hausfeld Co.
300-320 MOORE ST. HARRISON, OHIO

Gray Iron Founders Plan Meeting

Gray Iron Founders' Society will hold its 22nd annual meeting at the Netherland Plaza Hotel, Cincinnati, Oct. 12-13. Preceding the regular meeting the board of directors will meet on Wednesday, Oct. 11. Luncheon for the retiring board will be held following the meeting and that evening the officers will meet for the Officers' Night Dinner.

The tentative business program follows:

Thursday, Oct. 12

8 a.m.—Registration
9:15 a.m.—Business session
Remarks of society president: Hermann P. Good, Textile Machine Works, Reading, Pa.
Report of treasurer: Henry J. Trenkamp, Ohio Foundry Co., Cleveland
Report of executive vice president: Raymond L. Collier, Cleveland
Reports of Committees:
Advertising: E. J. Bothwell, International Nickel Co., New York
Budget & Finance: Henry J. Trenkamp
Cost: Arthur E. Hageboeck, Frank Foundries Corp., Moline, Ill.
Handbook: Hermann P. Good
Safety: George Riley, American Brake Shoe Co., New York
Statistical: E. L. Roth, Motor Castings Co., Milwaukee
Technical: E. B. Sherwin, Chicago Hardware Foundry Co., North Chicago, Ill.
Technical Director: Charles O. Burgess
Terms & Conditions of Sale: Peter E. Rentschler, Hamilton Foundry & Machine Co., Hamilton, O.
Foundry Educational Foundation: John M. Price, Ferro Machine & Foundry Co., Cleveland
National Castings Council: Hermann P. Good
Foundry Advisory Committee to the Munitions Board: Walter L. Seelbach, Superior Foundry Inc., Cleveland
12:30 p.m.—Industry luncheon
"Selling the American Tradition," William Grede, Grede Foundries, Inc., Milwaukee
2:30 p.m.—Business session
Symposium on Foundry Cost Accounting: John L. Carter, cost consultant; C. E. Westover, Westover Engineers, Chicago; Dickey Dyer, Dyer Engineers, Cleveland
4:30 p.m.—Committee meetings
5:30 p.m.—Social hour—buffet supper

Friday, Oct. 13

9:30 a.m.—Business Session
"Selling Gray Iron in a Competitive Market," W. L. McGrath, Williamson Heater Co., Cincinnati
"Can Gray Iron Be Used?" E. R. Bean, engineering consultant, Detroit
"Let's Protect Our Workmen," James E. Trainer, Firestone Tire & Rubber Co., Akron, O.
12:45 p.m.—Industry luncheon
Introduction of new board of directors, new officers, and presentation of citations and awards. Speaker: Hon. Josh Lee, former U. S. senator from Oklahoma, "The Sky Is the Limit."

Book Review

Proceedings of the American Society for Testing Materials, Vol. 49, 1949, 1240 pages, 6 x 9 in., published by the American Society for Testing Materials, Philadelphia.

This extensive volume reports the complete proceedings of the 52nd annual meeting of the ASTM held in Atlantic City, June 27—July 1, 1949. The text includes a summary of the proceedings, the annual address of the president, reports of the different administrative committees, committee reports including those on ferrous and nonferrous metals, the Edgar Marburg lecture and the technical papers

(*Concluded on page* 170)

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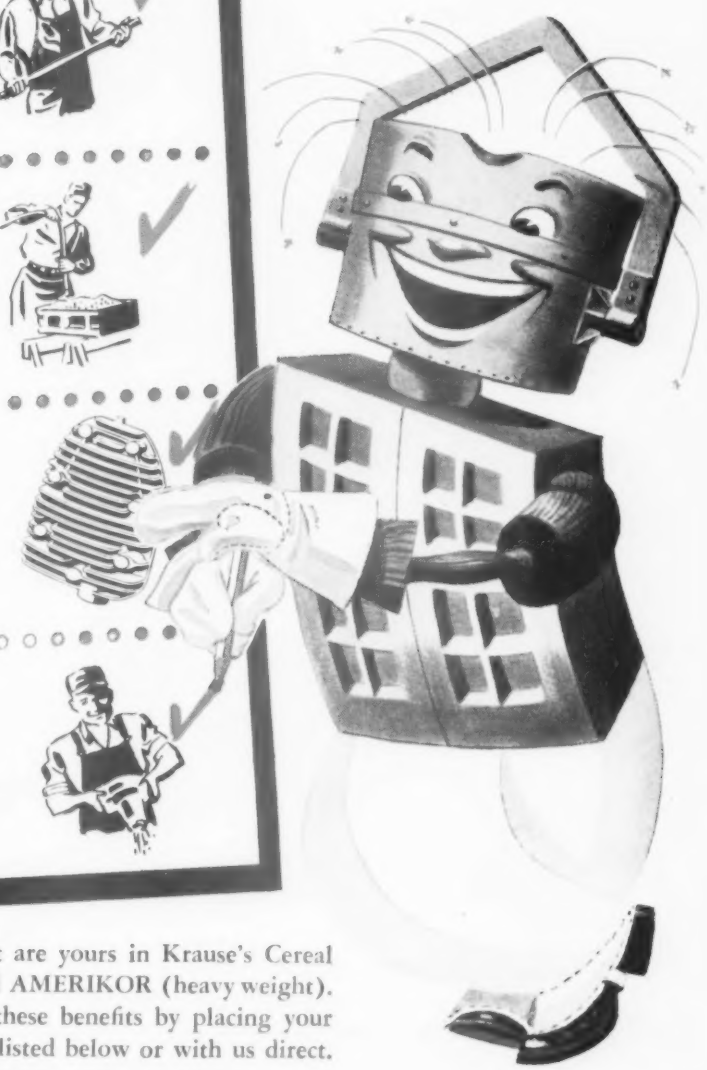

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Truscor (Light Weight) AND **Amerikor** (Heavy Weight)

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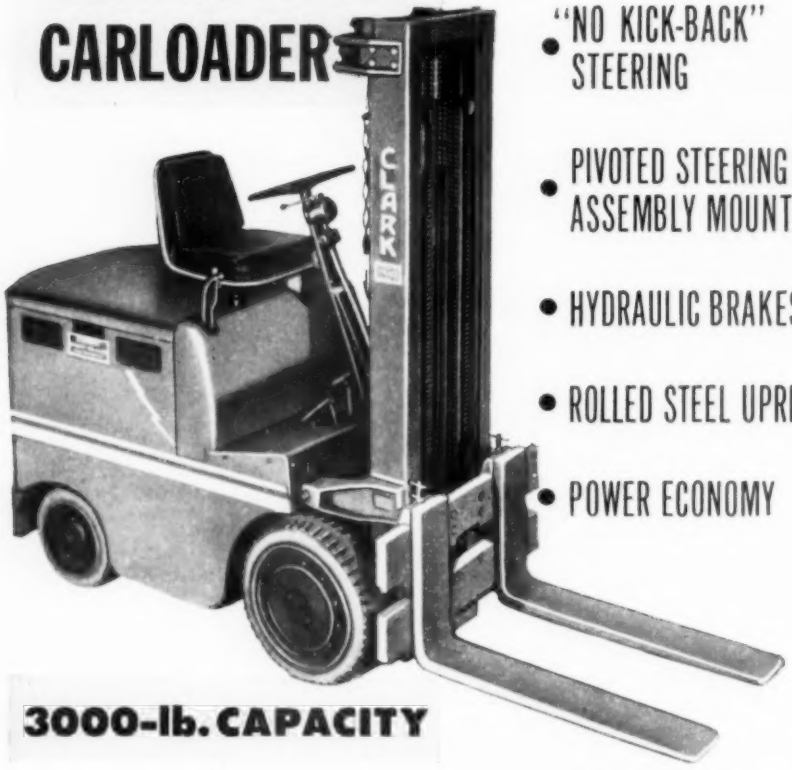

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AUTHORIZED CLARK INDUSTRIAL TRUCK PARTS AND SERVICE STATIONS IN STRATEGIC LOCATIONS

(*Concluded from page* 168)

presented during the meeting. Summaries of the proceedings of the spring meeting symposium and the Pacific area national meeting also are included.

Of special interest to the foundry industry are various committee reports, including sections of committee A-1 on steel, A-3 on cast iron, A-7 on malleable iron, B-2 on nonferrous metals and alloys, B-5 on copper and copper alloys cast and wrought, B-6 on die cast metals and alloys, B-7 on light metals and alloys, cast and wrought.

AFS Book Suggests Research Projects

"Foundry Research Projects," a new booklet published by American Foundrymen's Society, 616 South Michigan Ave., Chicago 5, outlines suggested research projects in the fields of malleable iron, gray cast iron, cast steel, light metals, solidification of metals, foundry sand, fluidity, and hot tears.

The pamphlet lists a limited number of problems in these fields, and states that results of study on any of them would be of interest and value in increasing the fund of scientific knowledge and in possible practical foundry application. Each topic is presented in the following outline: Discussion of the problem, value of the results, suggested procedures, and facilities required.

The topics are suggested for doctorate problems in metallurgy, master's problems, group problems to be conducted by a class throughout a school year, and for research by a commercial foundry. The College Research Projects Committee of the AFS, which compiled the booklet, will assist in providing data available on these problems and in arranging co-operation with foundries which might provide material to assist in the project

Issues Buyer's Guide

Hickman, Williams & Co., 230 North Michigan Ave., Chicago 1, celebrating its 60th anniversary this year, has issued a buyer's guide, listing commodities offered by the company in its various territories. The guide is not a metallurgical handbook, but simply gives brief, descriptive, informative data concerning the manufacture, properties and uses of industrial raw materials handled by the company. It was prepared by Ford Snyder, company metallurgist.

Above: **Bartlett-Snow Apron Conveyor** Handling Castings from the Shakeout in a Large Production Foundry.

Shakeout in Large Southern Foundry Showing Dust Hood and Castings Handling.

Apron Conveyor in Cleaning and Inspection Departments in a Large Midwestern Malleable Foundry.

Castings Handling

stops profit leaks

● Bartlett-Snow castings handling and cleaning systems reduce the time—and cost—of handling castings from the shakeout to the shipping room. They permit the cleaning room and inspection operations to be synchronized to the tonnage passing over the shakeout — eliminate rehandling — and produce a controlled flow of castings, similar to the controlled flow of molding, pouring and cooling made possible with a run-around mold conveyor.

Complete facilities including casting coolers. The C. O. Bartlett & Snow Co., 6201 Harvard Ave. Cleveland 5, Ohio.

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FABRICATORS

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Industry BRIEFS

MACHINED Steel Castings Co., 1450 South Mahoning Ave., Alliance, O., is being liquidated and all land, buildings, equipment, and materials are to be offered at public auction Sept. 12. Among the major equipment to be sold are seven cranes, two open hearth furnaces, a shot blast cleaning unit and a water blast cleaning system.

* * *

Wallace Clark & Co., 521 Fifth Ave., New York 17, for the past 30 years international management consultants, has been incorporated. Mrs. Wallace Clark, who has headed the company since her husband's death in 1948, is president and a director. Other directors are Alfred C. Bruce, William E. Camp, J. Coburn Musser, William B. Nichols and David Remer.

* * *

Erie Forge Co., Fifteenth & Cascade Sts., Erie, Pa., has been sold to a group of industrialists, for approximately $4,500,000, according to E. H. Lang, company president. The new owners, headed by E. Richard Ebe and Mortimer S. Gordon, New York, plan expansion and operation of the company and its subsidiary, Erie Forge & Steel Co., Green Garden Rd., Erie, Pa., under the continued presidency of Mr. Lang and his associate officers.

* * *

R. P. M. Mfg. Co., and J. G. Doyle Engineering Co., manufacturers of rotary mowers in Kansas City, Mo., have acquired the Hutchens plant at Lamar, Mo., and are constructing a foundry adjacent to the building. Estimated cost of expansion is $25,000. Operations of the two companies will be moved to Lamar.

* * *

Great Lakes Carbon Corp., 18 East 48th St., New York 17, has purchased the coke plant of Laclede Gas Light Co., St. Louis, and will continue to sell the latter company's metallurgical coke through the same distributors who have handled the company's product for many years.

* * *

H. G. Enderlein Co., Whitaker Ave. & Roosevelt Blvd., Philadelphia, has begun construction of an additional plant, Unit 3, at Tacony, Pa. The new unit, being erected on a 4-acre site, at a cost of approximately $260,000, will supply 30,000 sq ft of molding space, 8000 sq ft of pattern and storage space and 1000 sq ft of office space. Completion is scheduled for Sept. 15. H. G. Enderlein is president of the company which has a branch plant at Grenloch, N. J.

* * *

Automatic Transportation Co., 149 West 87th St., Chicago, has appointed Inter-State Industrial Equipment Co., 3519 Troost Ave., Kansas City, Mo., as representative for its line of electric industrial trucks in all of Kansas and the western half of Missouri. Earl R. Calvin, formerly with Mason W. Haigh & Sons, Peoria, Ill., will head the newly organized sales company.

* * *

Harmony Foundry Co., 1300 North Illinois St., Belleville, Ill. has agreed to sell its plant and property to the John C. Kupferle Foundry Co., 2882 North First St., St. Louis. The Kupferle foundry, which manufactures fire hydrants and plumbing supplies, will vacate its St. Louis site.

* * *

Falls Foundry Co., Menomonee Falls, Wis., has been incorporated to conduct a general foundry and machine shop business. Incorporators are Fred W. and Fred D. Busche and J. Thomas Kelly Jr.

* * *

Cleco Division, Reed Roller Bit Co., Houston, Tex., has opened a new factory branch and warehouse at 2832 East Grand Blvd., Detroit. Jim Reed and Roger Winship are factory representatives, working out of the new office.

* * *

Harbison-Walker Refractories Co., Pittsburgh, has begun construction of a new Cleveland office and refractories warehouse, to be located at 1986 West Third St. Completion is expected about the middle of October.

* * *

American Smelting & Refining Co., 120 Broadway, New York 5, has reorganized its sales and distribution system for continuously cast brass and bronze products. Formerly distributed through Ampco Metal Inc., Milwaukee, the products will be handled by American Smelting representatives in eastern, midwestern,

(*Continued on page* 174)

CASTINGS DISPLAY was sponsored by Superior Foundry Inc., Cleveland, at the 35th Annual International Convention, National Association of Purchasing Agents, June 11-14 at Cleveland Public Auditorium. John Dunbar, company sales manager, was in charge of the display booth assisted by Steve Feiss, sales engineer. Harold Wheeler, personnel director, designed the display

Cut core baking time 50%... with Monsanto RESINOX core bonding resins

You can double the capacity of your core baking ovens—cut baking cycles up to 50% or more – by switching to Monsanto's Resinox phenolic resins for core bonding. No extra equipment needed. Here are *additional* advantages reported by foundries where Resinox is being used as a bonding agent for the core sand:

Better Cores . . . Better Castings

1 Resinox bonded cores have higher baked tensile strength and hardness . . . thus core breakage is reduced. Cores have a finer surface finish, producing castings with smoother surfaces and more accurate detail.

Longer Storage . . . Better Collapsibility

2 Cores made with Resinox can be stored for indefinite periods with a minimum of deterioration. Resinox bonded cores possess adequate hot strength yet collapse readily and completely, greatly assisting shake-out and reducing scrap from hot tears.

Speed Production . . . Lower Costs

3 Use of Resinox greatly reduces smoke nuisance in the plant, resulting in improved working conditions and increased worker efficiency.

Resinox Finds New Use In "C" Process

In the "C" Process, Monsanto's Resinox dry resin compounds are used to bond sand to produce thin, extremely lightweight foundry molds. This new technique promises to revolutionize the foundry industry. Its advantages include: exceptional dimensional accuracy, extremely fine surface finish, greater rate of production, better metal yields. Write today for production information about the use of Resinox resins for core bonding and for the "C" Process. Resinox Reg. U. S. Pat. Off.

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Please send me information on:

☐ Resinox phenolic resins for core bonding.
☐ Resinox Production Information Bulletin No. 61 on the "C" Process.

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Production Protection!

During the course of our sixty years in the service of the foundry industry we have weathered the economic storms of booms, busts and wars.

Like everyone, we too deplore these disruptive times, but, we've also learned the "hard way" how to cope with the many production problems that arise during extraordinary periods.

So, when the going gets "rough" and foundry commodity problems appear beyond solution, turn to Hickman, Williams for helpful service.

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VICTOR FERROPHOSPHOROUS
SHOT AND GRIT, FLUORSPAR

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CLEVELAND · PHILADELPHIA · PITTSBURGH · INDIANAPOLIS

(*Continued from page* 172)

southern and southwestern areas, with Kingwell Bros. Ltd., San Francisco, handling the Western area. John L. Kimberly, sales manager, directs the new program from the Perth Amboy, N. J., plant. Ralph W. Bailey and John V. Hackett are assistant sales managers. Donald S. Goebel, who handled the product line at Ampco, has joined American Smelting and will make his headquarters at the Whiting, Ind., plant.

* * *

Benjamin Harris & Co., Chicago Heights, Ill., smelters and refiners of brass and bronze ingots, about half of whose plant was destroyed by fire on May 8, have reconstruction well under way with completion scheduled for late fall. Capacity is being increased 15 to 25 per cent through installation of new and modernized equipment. Despite the fire, company has continued to serve its customers.

* * *

Chicago Eye Shield Co., Chicago, has appointed Guardian Safety Equipment Co., 427½ Moreland Ave. N. E., Atlanta, distributor for Georgia and South Carolina. John M. Walter, formerly representative for Davis Emergency Equipment Co. in Atlanta and Newark, N. J., will head the new distributorship.

* * *

Equipment of the former Eberhardt & Wagner Co., Chicago, brass and aluminum foundry, was sold at auction in July. The building, located at 2011 W. Fullerton Ave., is being offered for sale by the owner, T. L. Arzt Foundry Co., 4020 W. Schubert Ave., Chicago 39.

* * *

Topeka Foundry & Iron Works Co., 300 Jackson St., Topeka, Kans., has closed its foundry but will continue to operate its machine shop and fabrication department.

* * *

Ironton Fire Brick Co., Ironton, O., has appointed Federal Foundry Supply Co., 4600 East 71st St., Cleveland 5, as distributors of its refractory products for the foundry industry.

* * *

J. O. Ross Engineering Corp., formerly located at 350 Madison Ave., has moved to new and larger quarters at 444 Madison Ave., New York 22.

* * *

Burkhart Engineering Co., 1221 Locust St., St. Louis 3, has been established to design, manufacture and market oil refinery fittings. Merle E. Burkhart, formerly associated with the Key Co., East St. Louis, Ill.,

(*Concluded on page* 176)

2 Good Ways to Reduce Non-ferrous Cleaning Room Costs!

Use **NORFLEX WHEELS** for Removing Gates and Risers

(1) Sturdy, yet flexible NORFLEX Wheels are reducing non-ferrous cut-off costs everywhere because they're strong and safe and will withstand considerable sidegrinding, twisting and bending.

(2) Although great strength and flexibility are outstanding features of NORFLEX Wheels, they cut fast, often faster than conventional cut-off wheels.

(3) Because NORFLEX Wheels often last four to six times longer than conventional wheels—with practically no danger of breakage — fewer wheel changes are necessary, and a substantial saving in labor cost, grinding wheel expense and grinding time is possible.

and **CRYSTOLON WHEELS** for Removing Excess Metal

CRYSTOLON Wheels, especially designed for grinding non-ferrous castings, feature a fast, smooth cutting action insured by strong, sharp CRYSTOLON abrasive and filler treatments which prevent wheel loading.

Their extra long life is insured by special B-5 and B-7 resinoid bonds for high speed wheels and by vitrified bond for slow speed wheels. They are available in a variety of sizes and shapes to fit all standard bench, floor stand and portable grinders.

Why not arrange for a trial with your Norton abrasive engineer or distributor?

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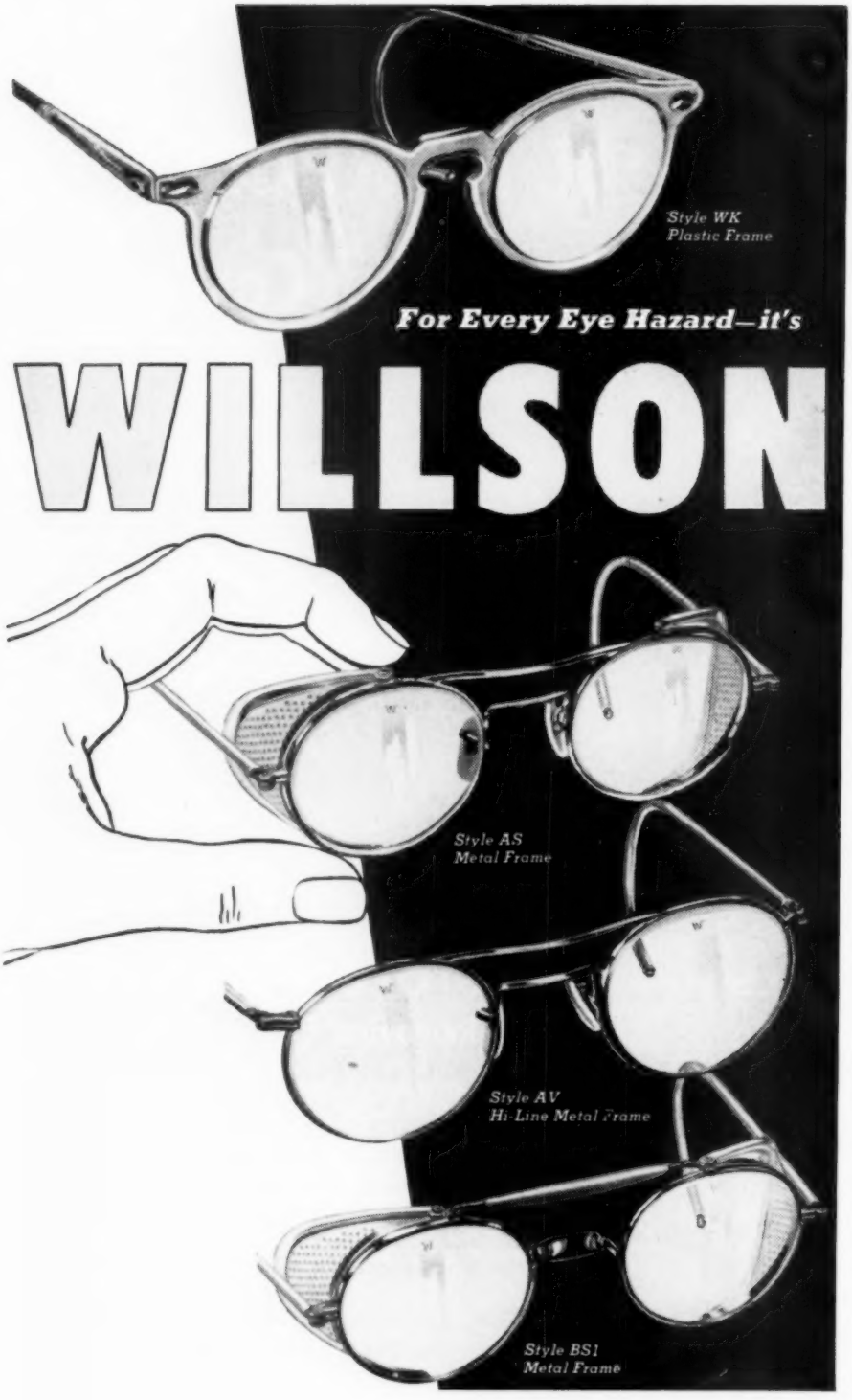

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. . . only the most complete line of safety spectacles with Super-Tough* lenses gives you *all three* in metal or plastic frames. You'll find WILLSON safety spectacles an ideal combination of strength, comfort and good looks. And you need *all three* to get full cooperation from workers who must wear eye protection. See our new catalog for complete information. Get it from our nearest distributor, or write direct to WILLSON PRODUCTS, INC., 237 Washington St., Reading, Pennsylvania.

(Concluded from page 174)

is president, and H. Schlarman is sales manager of the West coast office. K. P. Wesseling is vice president and treasurer; H. H. Stern, secretary, and W. W. Blase assistant secretary.

Smoke Prevention Group Meets

Air Pollution and Smoke Prevention Association of America, formerly the Smoke Prevention Association of America, changed its name and adopted new by-laws at its convention in Montreal, Canada, May 25. It is a voluntary, co-operative, nonprofit organization without capital stock, whose purpose is to foster control of atmospheric pollution and improve air sanitation. It is financed by dues of individual, company, and sustaining members.

Until a permanent executive secretary is appointed, Battelle Memorial Institute, Columbus, O., is acting as headquarters unit for the association with Dr. Hamnett P. Munger, in charge of Battelle's air pollution research, as executive assistant.

Norton Co. Reaches 50-Year Mark

This year marks the 50th anniversary of the Grinding Machine Division, Norton Co., Worcester, Mass. Originally incorporated as the Norton Grinding Co., the present division was an enterprise independent from the then existing Norton Emery Wheel Co., which became the Norton Co. in 1906. The Norton Grinding Co., however, remained as such until 1919, when it was merged with Norton Co., becoming the Grinding Machine division as it is now known.

Book Review

The Foreman's Place in Management, by T. G. Newton and Bleick VonBleicken, cloth, 150 pages, 5¼ x 8¼ in., published by the National Foremen's Institute, New London, Conn. Price $2.50.

This is the first volume of a series of books on standard management practice, and deals with some human relations or leadership problems. The first section discusses professional foremanship, foreman-management problems, and basic steps in making the foreman a part of management. Section two considers that human relations is everybody's job, the dollar and cents value of human relations, and management and labor.

COMPLETE SAND HANDLING SYSTEMS

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A complete sand handling system. Shakeout sand elevator, overhead storage, and mullers in background. Conditioned sand is delivered to overhead molding hoppers. Completed molds are set out on gravity conveyors for pouring from overhead monorail cranes. System handles 60 tons of sand per hour.

This unit is the heart of a sand handling system. Elevator carries shakeout sand to screen and bin conditioning unit. Sand passes into muller in batches as required. Prepared sand is delivered by conveyor to molding hoppers. This unit is designed for large or small systems.

are you planning a new or improved SAND HANDLING SYSTEM?

Here are 4 important reasons why the NeWay plan is the right way and profitable way to modern, efficient, low-cost sand handling:

- *Free engineering* layouts, service and estimates *by practical engineers.*
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NEWAYGO ENGINEERING COMPANY **NEWAYGO, MICHIGAN**

ALSO MANUFACTURERS OF: The revolutionary new *Handy Sandy* and *Reddy Sandy*, complete package units for smaller installations. Write for literature.

TECHNICAL REPORTS—IBF Conference

Reports on additional papers presented at technical sessions of the Institute of British Foundrymen's 47th annual conference are given here. An account of other features of the conference was published in the August issue

By VINCENT DELPORT
European Manager
THE FOUNDRY

AMONG the papers relating to gray iron presented at the recent annual meeting of the Institute of British Foundrymen, one of special interest was "Some Properties and Applications of Spheroidal Graphite Cast Iron," by Dr. A. B. Everest, the Mond Nickel Co. Ltd., London. The author summarized published figures and new data available from the practical experience of the magnesium process gained in the laboratories of the Mond Nickel Co. and through their development work in foundries. He said that development of spheroidal graphite cast iron will go a long way toward revolutionizing and extending the use of cast iron, but he also said that only a limited number of applications of this new type of cast iron were established, and new uses must be regarded as experimental.

He pointed out that the mechanical properties of spheroidal graphite iron are superior to those of ordinary iron.

Dealing with production properties, the author stated that machinability of the special iron is good, tool life is also favorable but power consumption is higher. More work will have to be done before definite conclusions can be reached in regard to wear, heat, and corrosion resistance. With regard to bursting pressure, castings made of spheroidal graphite iron do not shatter as is the case with normal flake graphite iron, but they bulge and split. Preliminary tests on surface finishing are encouraging.

Replying to questions and comments, Dr. Everest said that since the paper was written, tests on malleable irons gave some results that were of a higher order than those shown in the tables. He said that results obtainable from preparation of the special iron were reproducible, as could be seen from the literature in America. Replying to a question on the build-up of nickel, he thought it had been proved mathematically that the build-up was not so great and it was not an insuperable difficulty. In the spherulitic graphite irons the effect of nickel giving air hardening properties would be the same as for flake graphite iron.

N. P. Newman, immediate past president, IBF, and Mrs. Newman (left) talking to Mrs. William W. Maloney and R. L. Handley, president, Lancashire branch, IBF. Mr. Gibson of Australia is behind Mrs. Maloney

On the question of heavy sections, up to 6 or 8 in., Dr. Everest referred to American publications which mentioned that sections up to 6 in. had been made and checks had shown that desirable properties were obtained. In regard to welding, the author confirmed that successful welding had been carried out, using ordinary methods. The actual weld metal was nickel or nickel-copper.

He concluded by saying that pearlitic iron was more wear resisting, and he thought that for any particular section there would be a heat treatment which would give the pearlitic structure in any thin sections as might be required.

A paper on *"Properties of Cast Iron at Subatmospheric Temperatures"* was presented by G. N. J. Gilbert, British Cast Iron Research Association. This is of interest in the production of liquid air, in certain chemical processes, and in industries dealing with refrigeration. After reviewing previous work on the subject, the author describes experimental work done in the laboratories of the B.C.I.R.A. Twenty-one different materials were examined.

Tests were made at room temperature without low-temperature treatment, and at temperatures between room temperature and —100° C. In his conclusions the author states that gray irons show, in general, a rise in tensile strength of up to 12 per cent and a fall in impact strength of approximately 30 per cent at temperatures of —100° C. The low temperatures have no adverse effect on subsequent room temperature properties.

Impact strength of cerium-treated irons decreases rapidly as the temperature falls below normal. A rise of 14 per cent was obtained at —100° C. Acicular and martensitic irons show a fall of impact value of up to 50 per cent at —100° C, and the tensile strength increases. For austenitic materials, impact value rises as the temperature decreases, up to the phase change; beyond this point the impact value falls off rapidly.

In the discussion, Mr. Hallett said that for a long time he had suspected that silicon plays an important part in determining the stability of austenitic irons at low temperatures and at slightly elevated temperatures. He thought the paper showed clearly how important the elements of silicon are

(*Continued on page* 180)

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LADLES lined with refractory brick and other well-known products used for this purpose gave three to five days' service, handling 750 to 1200 tons of iron.

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WHAT ABOUT COSTS? Figuring everything in . . . labor, downtime, installation and maintenance expense, and the cost of lining materials . . . the old way cost about $18.00 a day. On the same basis, a lining of Ironton *NOJOINT* costs $12.00 a day.

Our Service Engineer will come to your foundry to show you how to make this saving. Ironton sales representatives have full information. Telephone the nearest office listed at the left.

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(*Continued from page* 178)

in determining the stability of austenitic irons. Replying, the author said he was inclined to agree, but it was not absolutely certain that silicon played the whole part; there were many variables in the material examined.

E. J. Ronnie, chief chemist, and M. M. Hallett, chief metallurgist, Sheepbridge Engineering, Ltd., Chesterfield, contributed a paper entitled "*Experiences in the Application of Spectrographic Analysis in the Gray Iron Foundry.*" The authors state that the spectrograph is unsuitable for determining carbon, phosphorus and sulphur, but is suitable for determining virtually all other elements (except gases) likely to be present in cast iron, including those normally reported only as traces. They say that to obtain the best results it is desirable to use chill cast specimens, although useful results can be obtained from ordinary gray iron samples, and it has been found possible to perform analyses of pig irons by cutting out suitable lumps. The paper gives a detailed account of spectrograph analysis procedure with both the sparking technique and the photographing process.

Replying to points raised in the discussion, Mr. Ronnie agreed that it is quite possible to use spectrographic methods to determine the phosphorus content of iron. He said that in the estimation of magnesium in nodular or spheroidal cast iron, gray specimens were preferred to chilled specimens.

C. R. Tottle, lecturer in metallurgy, the University, King's College, Newcastle-upon-Tyne, contributed a paper entitled "*Deformation Characteristics of Five Gray Cast Irons at 400° C, 500° C.*" The author described how five gray cast irons, manufactured by the Meehanite process, and incorporating alloying elements, had been critically examined at 400° C, and incompletely at 500° C. The deformation at these temperatures had been measured in short time tensile tests, high sensitivity creep tests of 2500 hours' duration, and stress-to-rupture tests. The ductility had been shown to increase, in the rupture tests, as the stress is lowered, and the time to fracture increases. This increase in ductility occurred in the third stage of the creep.

Unstressed bars, inserted in the creep furnaces, showed no growth after 10,000 hours exposure, and no breakdown of the microstructure was observed in stressed bars, even at 500° C. Molybdenum was found to give the most effective resistance to deformation, compared with the basic composition, chromium-copper additions being second in order of merit.

A contribution from the foundry division, Federation of Swedish Mechanical Engineering Industries, was entitled "*Testing the Metal or Testing the Casting,*" and dealt with the new Swedish gray iron specification. It was presented by Erik O. Lissel who stated that specifications should be a guide for production control, inspection and design. The main problem is the relationship between the properties of the iron, the test bar and the casting. The correlation of iron and test bar appears to be quite readily established, if the bar is cast under standardized conditions. The problem, test bar properties vs. casting properties, however, seems to be much more difficult of solution.

Experimental data show that a reliable relationship between test bar and casting properties can be obtained only for castings of very simple shape. Considerable spread in strength has been shown to exist in similar sections of more complicated castings.

A comparison has been made between the British, American, German and Swedish cast iron specifications. The first three are quite similar and are designed to be a yardstick for both inspector and engineer. The Swedish specification, on the other hand, is drafted for production-control purposes only. No attempt is made to correlate test bar and casting properties. A program for the investigation of this relationship, however is planned.

Prefer Separate Test Bars

The following conclusions have been drawn: 1. The tensile test can be accepted for production-control purposes. 2. Tensile tests carried out on very small bars are apt to be erratic and should be avoided. 3. Separately cast test bars are to be preferred to cast-on test bars. 4. Separately cast test bars should be cast under standardized conditions. 5. The relationship between iron quality and casting properties should be studied statistically by means of test specimens trepanned from different castings and the "threshold strength" and spread should be determined as a function of the section size. 6. The correlation between iron quality and casting properties preferably should be presented in a cast iron data book and not be included in the specifications.

J. E. Worthington, British Iron and Steel Research Association, contributed a paper on "*Fluidity of Steel.*" After pointing out that a standard spiral test piece is generally recognized as the best suited for the determination of fluidity, he described a method of standardizing the pouring speed. When a standardized rate of pouring is used, the fluidity temperature curves show appreciably less scatter of results than those obtained previously. An average of six or seven spirals is sufficient to obtain a trustworthy curve.

It has been found that all fluidity temperature curves exhibit a break, indicating some restraining influence operating at the lower temperature ranges. It has been suggested that this influence may be due to the effect of surface oxide films, which are strong enough, below a certain temperature, to prevent the free flow of the metal.

The author concludes that: When compared at the same temperature, an increase in the carbon content in-

(*Continued on page* 182)

Delegates to the International Committee of Foundry Technical Associations attending the IBF annual conference. Left to right: E. O. Lissell (Sweden); Vincent Delport *(The Foundry)*; N. P. Newman, immediate past president, IBF; G. Blanc (France); R. Reitsema (Netherlands); I. Lamoureux (Belgium); M. Olivo (Italy); F. W. E. Spies, president-elect, International Committee; P. de Keiser (Belgium); Dr. Galetto (Italy); J. Foulon (Belgium)

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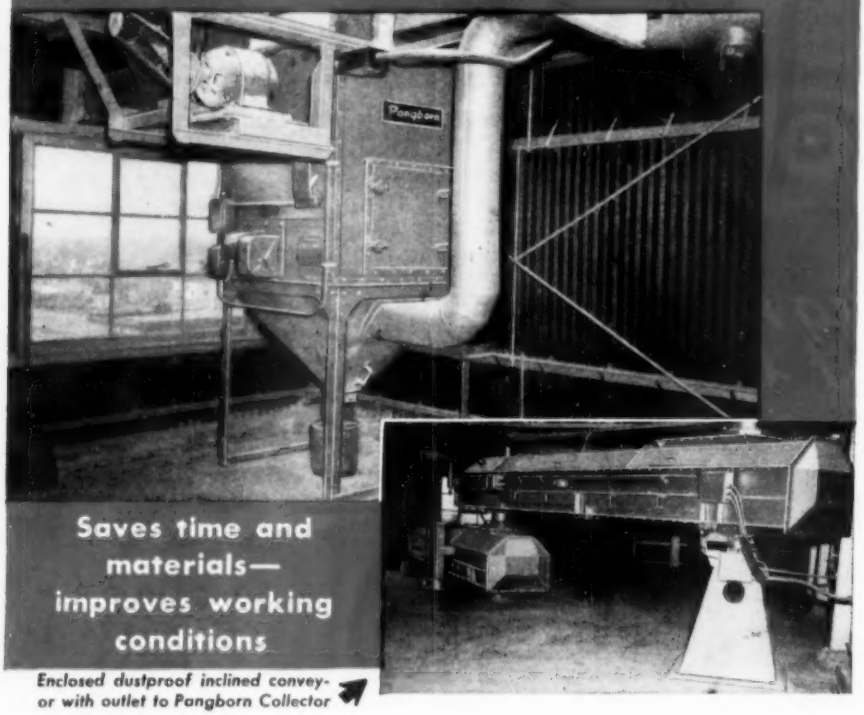

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(*Continued from page* 180)

creases fluidity. When compared at the same super-heat an increase in the carbon content reduces fluidity. Moisture in the sand between 2 and 4 per cent has no influence on fluidity. Variations in the silicon content between 0.5 and 1.0 per cent has little or no effect on the length of the run produced. An initial addition of chromium of only 0.76 per cent increases the fluidity of a plain carbon steel in the lower temperature ranges; further additions have no further effect. Except below 1530° C the fluidity of a steel is unaffected by addition of up to 3 per cent nickel; between 3 and 5 per cent additions increase fluidity. Addition of 1.2 per cent aluminum to a plain 0.2 per cent carbon steel greatly reduces its fluidity.

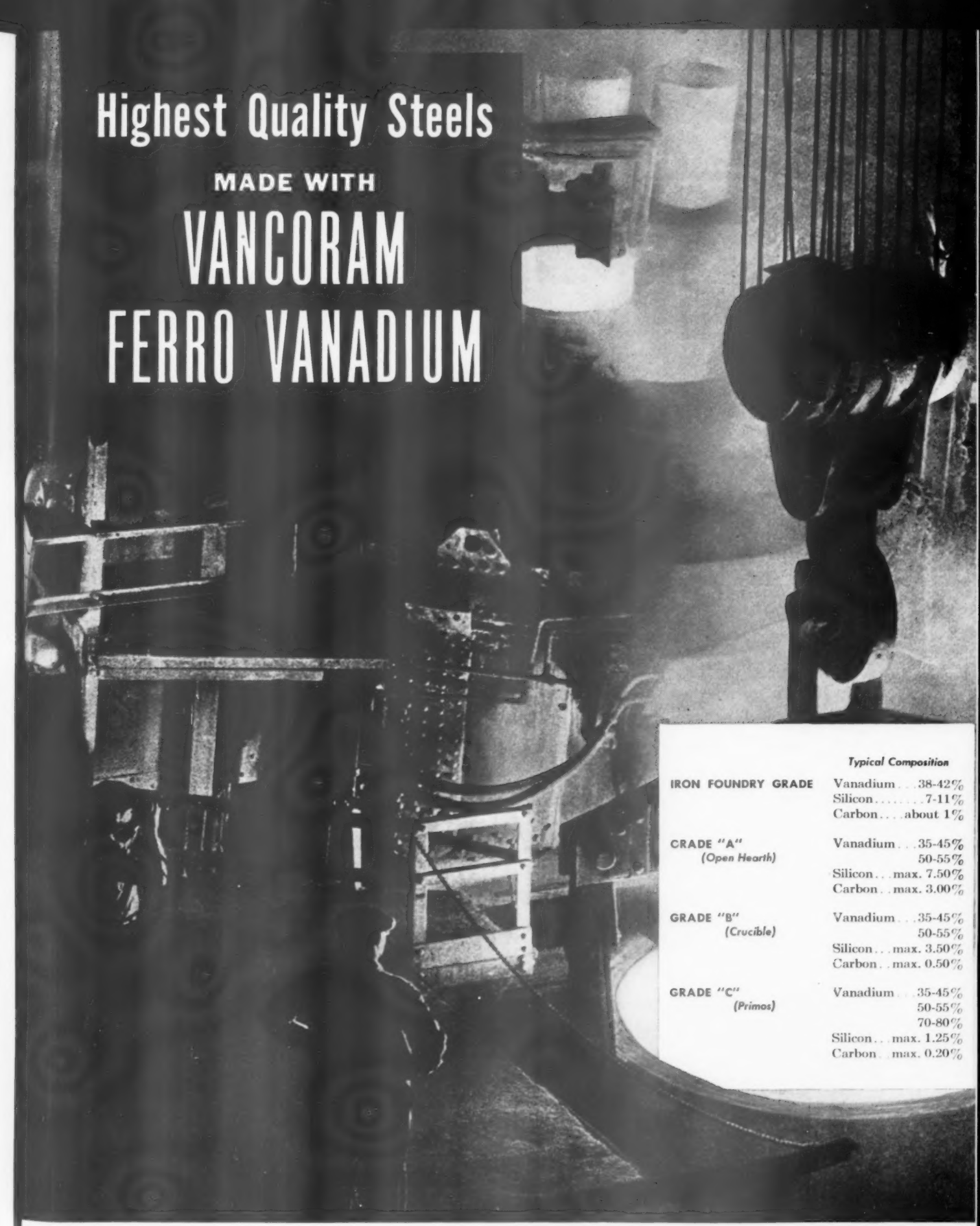
Another paper on fluidity by Dr. V. Kondic, lecturer in metallurgy, Birmingham University, was *"Effect of Liquid Metal Properties on the Casting Fluidity of Alloys."* The paper reviews data which relate the properties of a liquid alloy with results obtained in fluidity tests. The author stresses that fluidity is controlled by mold and metal properties as well as by casting factors. The paper deals with metal properties only. He points out that an alloy giving longer fluidity spirals would be considered superior for mold filling in making castings.

Conclusion Must Be Qualified

Such a conclusion may be justified only when the fluidity mold resembles closely in its design the mold for making castings. In general the question of interpreting fluidity results for founding and manufacturing purposes is still an open one. On the other hand the interpretation of fluidity testing for melting quality control or for research purposes for studying the nature of the liquid state is without major controversies.

These two papers on fluidity were discussed together. C. H. Kain commented that the trouble with these tests was that they were past measurements and as far as the foundryman was concerned, particularly in batch melting, not very useful. Mr. Worthington, in the first paper, had said that an average of six or seven specimens was sufficient to obtain a trustworthy figure. In actual foundry practice, this many specimens could not be poured and an average calculated. To be of any good one test should be positive. He thought that greater attention should be given to devising a different method. He had himself tried and thought that the possibilities of pouring through a restricted orifice should be explored.

(*Continued on page* 184)



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GRADE "A" *(Open Hearth)*	Vanadium . . . 35-45% 50-55% Silicon . . . max. 7.50% Carbon . . . max. 3.00%
GRADE "B" *(Crucible)*	Vanadium . . . 35-45% 50-55% Silicon . . . max. 3.50% Carbon . . . max. 0.50%
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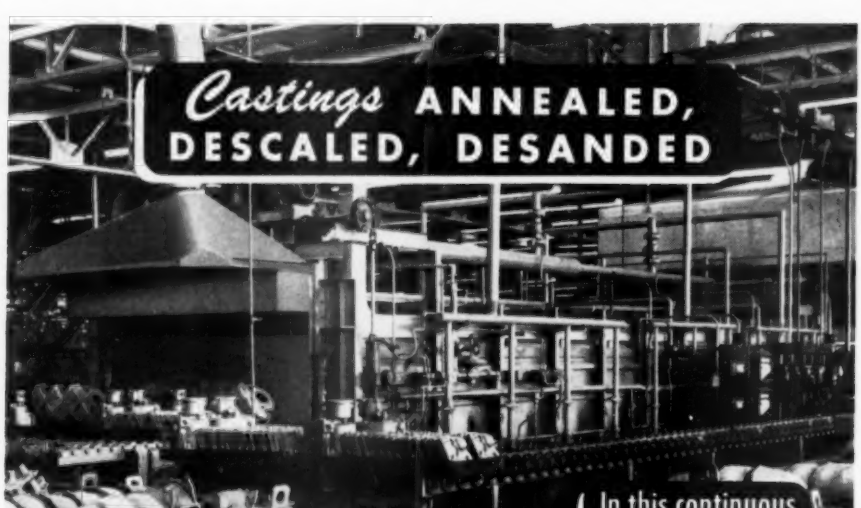

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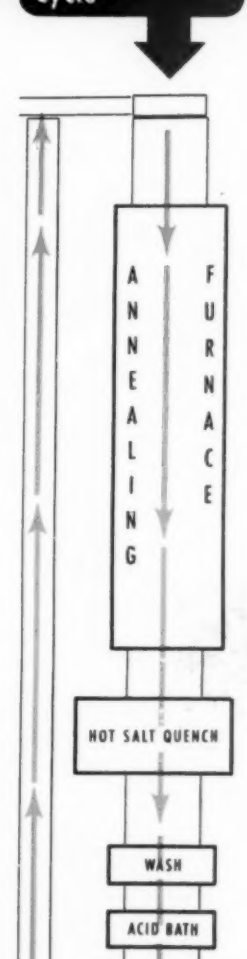

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(*Continued from page* 182)

Dr. Kondic replied that a very good test could be provided by the fluidity test, providing it was already related to what was wanted to be measured. He did not agree that an orifice would give good results; this method had been tried, but it was found to give the same results as viscosity did. Fluidity is not an expression of viscosity only, but of other matters also. Replying to a comment on the importance of melting conditions, Mr. Worthington said that he agreed that they were important. As regard sand conditions, he did not think that they had much effect, or that moisture had either.

180 South African Foundries

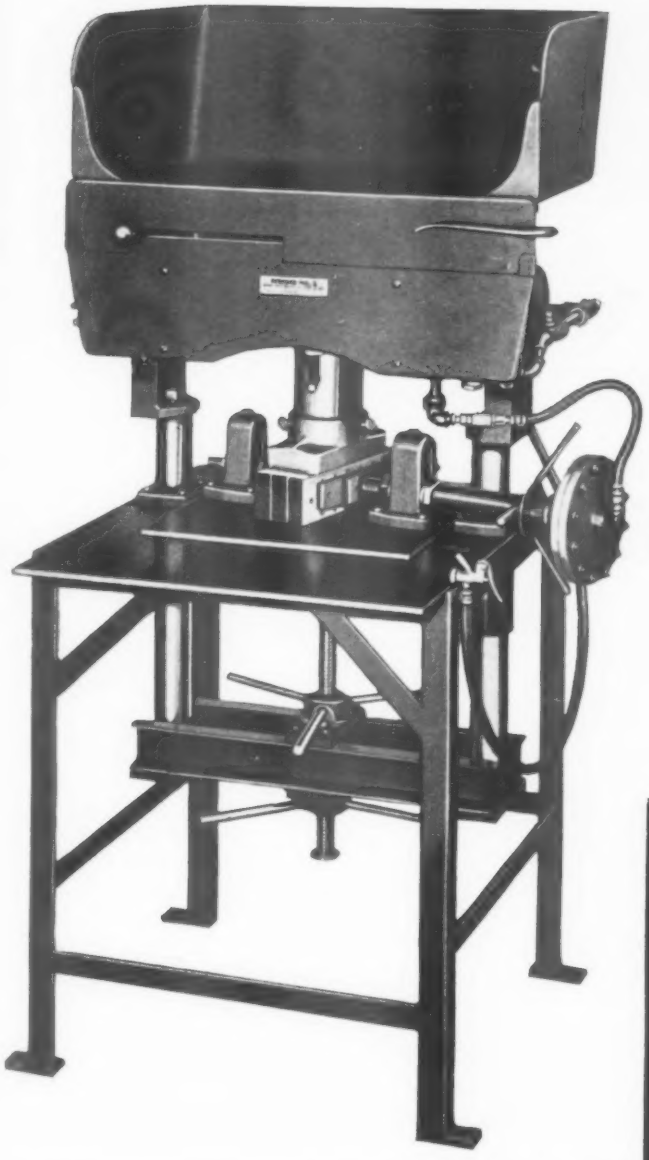
A contribution by H. G. Goyns, member of the South African branch of the Institute, gave a review of *"The South African Foundry Industry."* In South Africa, foundry products are largely for internal consumption, though the Rhodesias do, to a limited extent, draw on the Union for certain classes of castings. The quantities which would justify a high degree of mechanization have, until recently, been confined to railroad, mining and builders' castings and kaffir pots. In the Union there are approximately 180 foundries: 124 produce gray iron castings, white iron and Meehanite; 17 are steel foundries; there are two blackheart and one small producer of whiteheart malleable castings, and 85 nonferrous foundries. At present there are eight mechanized units in operation. Iron and steel castings are produced at a rate of 181,000 long tons per annum, and the foundries employ 14,000.

The official exchange paper from the Association Technique de Fonderie Belge was by J. Goffart, general manager of the foundries of John Cockerill & Co., Seraing. He chose for his subject *"The Rationalization of Sand Preparation."* The author has found that there is still no well established practice in regard to sand reclamation and the layout of plants.

In his paper he first discusses the characteristics of molding and core sands, and of agglomerating and bonding agents. The author then describes the various types of sand plant that should be used according to whether clay-bonded sand or sands with artificial bonding are used. He emphasizes that the action of the rollers in sand mills should be a rubbing action, not a grinding action; the terms used, both in French and in English give the impression, wrongly, that the grains are subjected to a grinding action. The paper further deals with the layout of a rational

(*Concluded on page* 186)

Redford CORE BLOWERS



REDFORD NO. 2 STATIONARY MAGAZINE TYPE CORE BLOWER . . . . .

New standards are being set with this machine, because every motion of your operator has been correctly evaluated to obtain a maximum of production with a minimum of effort.

8 OUTSTANDING FEATURES:

1. Large stationary work area.
2. Large sand supply hopper.
3. Stationary sand magazine.
4. Easy accurate locating of core boxes.
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CAPACITY: Cores up to 5#

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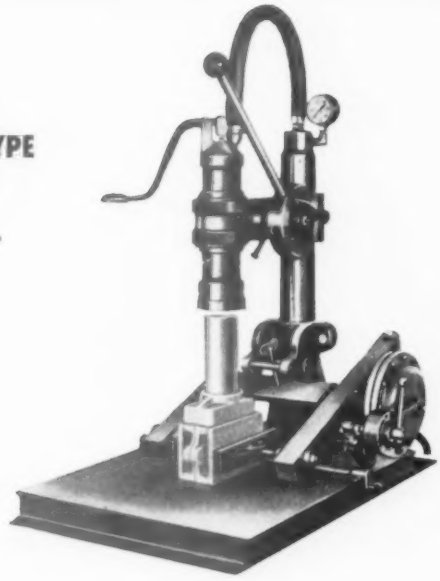

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Engine is *standard-make* . . . 4 h.p., 4-cycle gas. All parts are readily accessible. That means less maintenance time, more work-time. It will pay you to see how Moto-Bug can make your man-hours 3 to 4 times more productive. Contact your Kwik-Mix distributor of write to us direct.

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(*Concluded from page* 184)

sand preparing plant, dealing with the preparation of the sand recovered from the molds, wetting and storage, and the regeneration process proper.

The official exchange paper from the Association Technique de Fonderie, of France, was by H. Leplanche, who discussed *"Analogies Between Steels and Aluminum Bronzes."* In this paper, the author discusses: (a) The known analogies between the thermal diagrams of some Fe-Fe_3C alloys, and certain Al-Cu alloys; (b) The manner in which these analogies or similarities have enabled an interpretation of the behavior of aluminum bronzes under different heat treatment; (c) Finally, the manner in which these known analogies have led to the discovery of further analogies, offering fresh possibilities of progress to the metallurgist. In regard to (c), the author states that, both for pure steels and for pure aluminum bronzes, the following applies:

1. Spheroidization of the "coarse pearlite" is slow at the temperature of isothermal formation and remains incomplete even after long periods.

2. Despite the temperature drop, the spheroidizing rate increases with refinement of the lamellar structure. The acceleration due to refining of the structure is greater than the retarding effect of the temperature drop.

3. Generally, at lower temperatures, and particularly in the case of nongranular constituents, the rate of decomposition of the δ or β solutions much exceeds the rate of spheroidization, in such manner that the combined effect of decomposition and spheroidization does not disturb the development of the first of these processes.

4. Spheroidization is occasionally known to decrease the hardness, elastic limit and tensile strength considerably, and consequently to increase the machinability in proportion.

Book Review

Handbook on Designing for Quality Productions, by Herbert Chase, cloth, 564 pages, 6 x 9 in., published by the McGraw-Hill Book Co., New York. Price $7.50.

This is the second edition of a book published in 1944. The text is made up principally of articles published in several business papers. A small amount of material has been added, including some pertaining to the foundry industry.

The first portion includes a section on the design of die castings and one on the design of permanent mold castings by the author, and a

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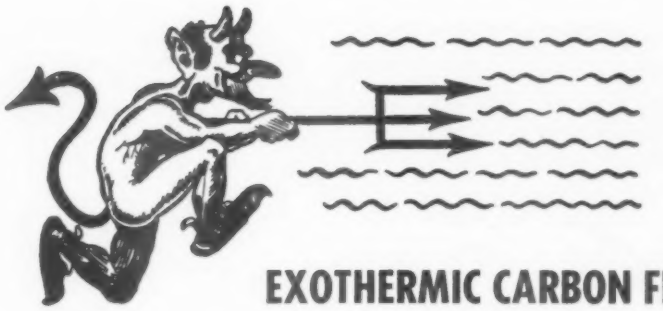

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EXOTHERMIC CARBON FREE LIQUIDIZER FOR FEEDING HEADS

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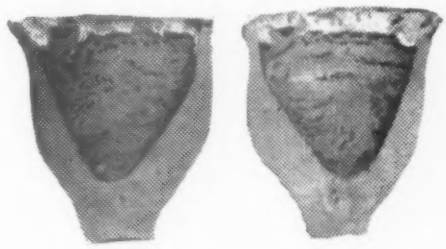
SOFFEL'S EXOTHERMIC CARBON FREE LIQUIDIZER reacts within itself exothermically, producing a temperature above 3200° F. actually increasing the temperature of the feeding metal to a point well above that of the metal in the main body of the casting, thus ensuring that the feeding metal will be the last to freeze. Shrink cavities in the casting caused by premature freezing of the feeding metal are eliminated. After the exothermic action has ceased, the LIQUIDIZER forms a soft insulating blanket on the metal. This confines the heat generated by the LIQUIDIZER and aids in maintaining the desired high temperature of the feeding metal in the heads.



Chrome-nickel-steel riser

In this riser six by six, with the application of 1 pound of SOFFEL'S CARBON FREE LIQUIDIZER, the average weight was reduced from 32 pounds to 13 pounds, a savings of 19 pounds of saleable metal which normally would have been discarded as scrap, but which was fed into the casting and produced a heavier, sounder casting. Note the feeding head can be knocked off easily saving burning costs. There is no better feeding head compound at any price than SOFFEL'S CARBON FREE LIQUIDIZER.

300 lb. aluminum bronze bearing cap cast with THERMOTOMIC feeding ring core under riser. Note small feeder opening which facilitates removal of riser from casting, resulting in greatly reduced cleaning costs.

SOFFEL'S THERMOTOMIC COMPOUND FOR ALL METALS AND ALLOYS

PATENTED

SOFFEL'S THERMOTOMIC COMPOUND is an exothermic molding compound which can be molded and baked into any desired shapes just as sand cores are made. It produces a temperature up to 3500° F. and is used as ring inserts under the risers, feeding heads and blind riser cracker cores. Also as a facing insert where it is desirable to maintain the fluidity of metal in the mold at those points where rapid cooling may cause piping, shrinkage or segregation. Great savings are realized through the reduction in height of risers as well as the cost of removing feeding heads. SOFFEL'S THERMOTOMIC COMPOUNDS are available for all metals and alloys, and should be used in conjunction with SOFFEL'S CARBON FREE LIQUIDIZER for best results.

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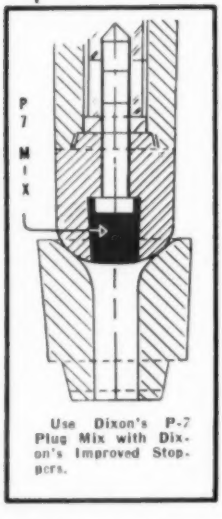

Use Dixon's P-7 Plug Mix with Dixon's Improved Stoppers.

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JOSEPH DIXON CRUCIBLE CO.

Since 1827

Jersey City 3, New Jersey

(*Concluded from page* 186)

section on the design of sand castings by Norman F. Hindle.

Part II deals with comparisons of various classes of materials, including those presented under the following headings: Die cast or sand cast permanent mold and die casting compared; which type of nonferrous castings; die cast or stamped; die cast or screw machine product; die castings and plastic moldings compared; malleable iron castings versus wrought parts.

The data presented in these articles are not sufficient to permit accurate engineering conclusions as to the best materials for a specific use. Due to the preponderance of information on die casting, a conclusion must be drawn that the author is somewhat prejudiced in connection with that form of fabrication.

The greatest injustice is done to malleable iron castings in the chapter "Malleable Iron Castings Versus Wrought Parts" which was added to this edition. The text consists almost entirely of a discussion of the replacement of certain malleable iron castings by stampings and forgings by the International Harvester Co. Any engineer or student consulting this chapter would get a completely distorted idea as to the importance of malleable iron in our economy and the future trends of the application of that product in engineering construction.

The author indicates that the book is designed as a reference for engineers and a textbook for students in engineering. While it is hoped that the engineer will have more accurate data on the materials presented in the text, it does seem that under no circumstance should the book be used as a text for engineering students. A completely distorted idea of the relative values of a number of important engineering materials would result.—F. G. S.

Holds Annual Forum

Porcelain Enamel Institute will hold its 12th annual forum, Sept. 13-15, at University of Illinois, Urbana, Ill. Subjects to be covered will include new application methods, technical progress, quality control, research data, plant management and new product development. Industry experts will present papers, followed by panel discussions on industry problems. Registration fee of $15 will be payable at registration desk. Advance registration cards should be sent to the Porcelain Enamel Institute, 1010 Vermont Ave., N. W., Washington 5.

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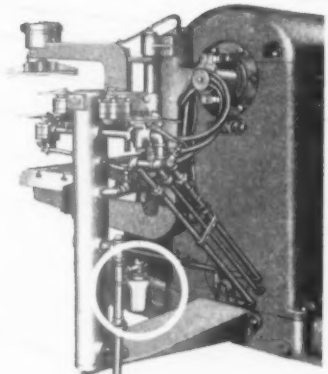
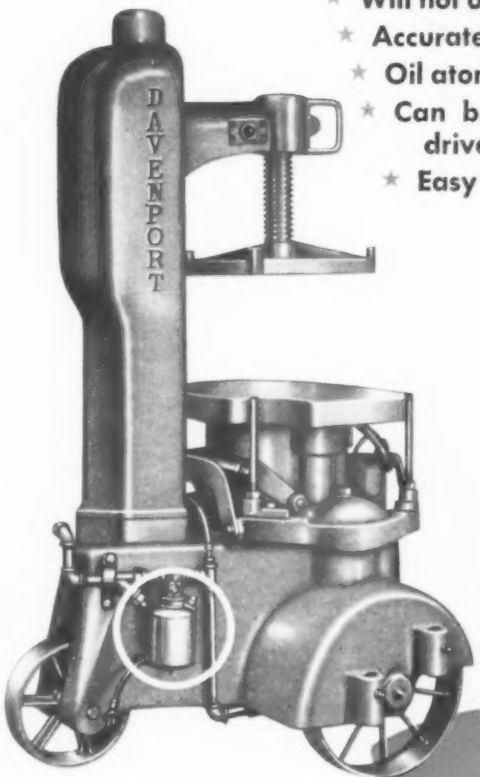


ROLLOVER



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Adventures of BILL

By PAT DWYER
Drawings by RICHEY

IN ONE of Kenneth Roberts delightful historical romances, *Rabble in Arms,* the principal character refers in a very eulogistic manner to his father, a shipmaster, shipbuilder and all-around citizen in the beautiful Province of Maine in North America before and during the Revolutionary period.

While the young man was preparing for his first voyage as master in one of his father's ships, the older man had given him sage advice. Among other items he warned the young man to be quite certain he saw what he looked at, whether a lee shore, a partly submerged rock, a cloud formation or a woman's face. In several crucial situations throughout the story the young man proved the truth of this piece of ancient wisdom. If possible, each instance increased and confirmed him in a proper and filial belief in his father's infallibility. The sentiment will be endorsed heartily by all dutiful and respectful sons, and will arouse a perfectly legitimate glow of pride and appreciation in the heart of any man fortunate enough to have a son or sons who say "Sir" when addressing him.

The truth of the old Maine shipbuilder's statement that a man should be sure to see what he looked at was brought home to me in a startling and mildly humiliating manner one day last month while Bill and I were enjoying a leisurely jaunt through Nova Scotia. On the road between Glace Bay and Louisburg we stopped to examine and admire a pyramid-shaped cairn of field stone about 8 ft high and approximately the same width across the base. A bronze tablet, 3 x 4 ft, attached to the side facing the highway and bearing a legend, apparently indicated that the cairn had some historical significance.

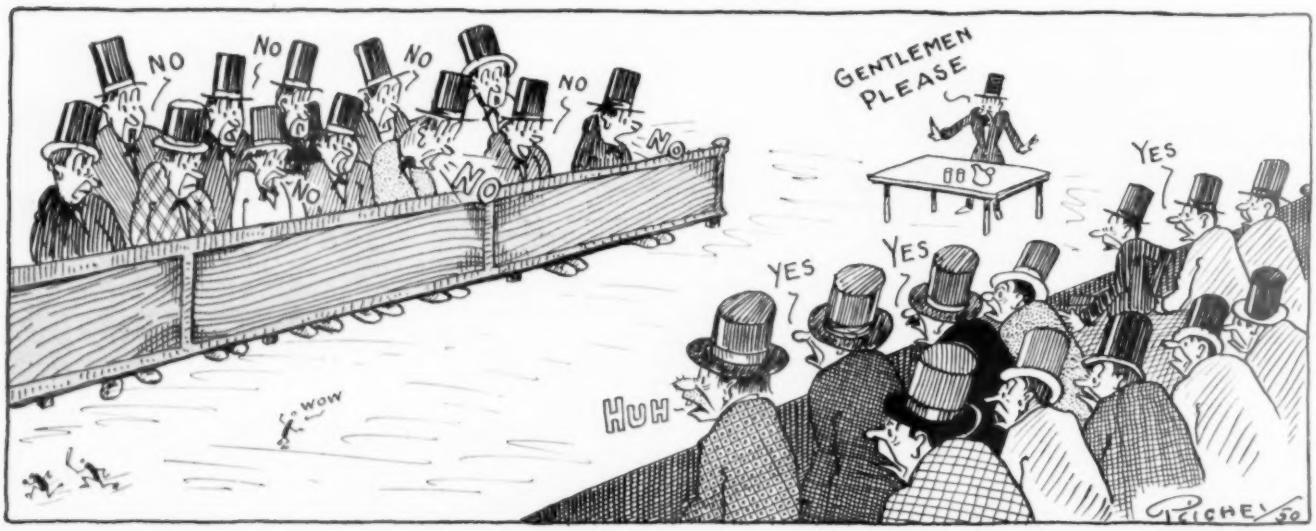
Bill searched diligently around the lower right corner for a name, a number, a date or any kind of mark to indicate who had conceived and brought forth what Bill described as "As fine a bit of foundry work as ever I laid the old peepers on." He gave up the search in disgust.

"Modesty is a nice and commendable virtue," he declared, "but it can be carried too far. Now, there is a job of which any man might be proud. If I knew who he was I should be pleased indeed to tell him. The job is a credit to the artist who designed it, to the patternmaker who laid it out and arranged the multitude of letters to fill the space, and to the highly skilled foundryman who produced the bronze replica with every letter and punctuation mark clean and sharp. Even from here, a distance which I conservatively estimate at 10 ft, I can read the inscription just as readily as I can read the score board at the ball park."

"Your eyes may be sharp," I admitted, "but I do not think they are sharp enough to read a message in the French language, and you can take my word for it that message on there is as French as the lonely and ghost-haunted ruins of Louisbourg, Beausejour and Port Royal. You may have picked up a few words many years ago while working in Sherbrooke and Montreal. Offhand and without putting too fine a point upon it, I am inclined to the opinion that many words picked up in that manner in the foundry are in the same class as the English language limericks that are fairly well known, but never appear in print. Also, it may not be out of place to remind you that a rapid, slurred and inflected word or phrase bears little or no resemblance to the written or printed form. For example, you hear a man refer to the United States as Laytaszoonee. You would need more than one pair of sharp little eyes to recognize that in Les Etats Unis."

Bill calmly ignored my well meant effort. He continued to read the message on the tablet in the tone and manner of one of the more repulsive radio boys explosively announcing that his sponsor's product, SQUAGGUM, squagg meaning squag and um meaning good, composed of eel grass, carefully selected hickory shavings and shellac, positively would cure

(*Continued on page* 192)



Dignified government members face loyal opposition wearing hats during session

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better castings

FOR GREEN SAND FACING

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You can quickly prove, at small cost, the economy and effectiveness of "Hercules" NVX with a production-scale test. 100-lb. test lots of NVX are now obtainable at the 1000-lb. price.

FOR FERROUS CORE MIXES

"Truline" Binder cuts core room losses. In steel foundries using silica flour, bentonite, or fireclay, it replaces core oil without impairing physical properties. In iron foundries using pitch-compounded mixes, it eliminates pitch. In both cases it gives stronger-handling, more uniform cores; speeds baking up to 25%.

"Truline" Binder also means easier collapsing cores, and up to 50% less cleaning time. Castings come out sounder, truer, cleaner.

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20th CENTURY DRAWN STEEL SHOT

The newest development in peening and blast cleaning abrasive—a *cut wire shot* that is endorsed by leading foundries as an invaluable contribution to the industry. It is more effective because it is absolutely uniform to start with, and the pellet size and mass remain uniform many passes longer. It is amazingly durable, outlasting cast steel shot at least 2 to 1.

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The leader of *malleable* abrasives—so outstanding that we invite comparison. *Lasts at least twice as long as ordinary shot and grit.* It is stress relieved and there is practically no shattering. Exclusive screening process insures outstanding uniformity.

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We also manufacture Hard Iron Shot and Grit —the top quality of its class.

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Howell Works—Howell, Michigan

(*Continued from page* 190)

thumb sucking, buck teeth, flat feet bandy legs and knock knees. No other person could make that statement!

By the time I had floundered, stumbled and scrambled half way down the face of the tablet, gathering the general sense from an occasional word here and there, I suddenly discovered the key to the puzzle. The second or lower half of the inscription was in English and that was the version Bill had been reading!

"The trouble with you," Bill very kindly pointed out, "and of course you are by no means alone, is that you don't see what you look at."

"I looked at the top line in French and naturally assumed that the entire message was in that language. I should have known that in this country, first colonized by the French and afterward for more than 100 years a battleground between supporters of the Union Jack and the Fleur de Lis, the two languages still are in use. English is the predominant language but certain sections of the country are as French today in habits, customs and language as they were in the day when Evangeline had all the young men in Grand Pre making sheep's eyes and suffering distractions in their prayers. Presenting the message in French and on the upper part of the tablet is merely a courteous gesture of respect and admiration for the gallant gentlemen who first explored the country and dug coal out of an outcropping coal seam."

Old stuff—See what you look at

"Old stuff," Bill dismissed the foregoing with an airy gesture. "I had it all from my Uncle Malachi many years ago after a trip to Halifax."

(*Continued on page* 194)

Industrial!

... PREFERRED FOR PERFORMANCE

THESE photos show "Industrial" flasks in actual operation at prominent foundries in the United States and Canada. Names on request.

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PITTSBURGH CRUSHED STEEL CO.
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STEEL SHOT AND GRIT CO.
BOSTON, MASS.

(*Continued from page* 192)

"The old boy appears to get around. What was he doing in Halifax?"

"Just gawkin' around. He was a champion gawker. One day an old crony, a prominent member of the government, took him for a tour through the legislative and senate chamber. This was during a recess or a vacation period or something. When the houses are in session all the members wear their hats. Whether this is an old Spanish custom or just a gesture of independence, the o.c. was not in position to explain. The government members sit on one side of the room and His Majesty's Loyal Opposition sit on the opposite side. Purry neat, hey? The opposition on the opposite side!"

"Well," I said, "they had to sit some place. You hardly would expect them to sit in the ante room, the stairway or the fire escape, even if they had their hats on. What else did the good Samaritan show your loving old uncle?"

"In the senate chamber his friend showed him a beautiful tablet approximately 30 x 50 in., elaborately framed and artistically lettered. The inscription was in short lines from one to five words. My uncle was so profoundly affected that he copied the message in his own little crabby hand. Here it is—if I can make it out: TO THE GLORY OF GOD AND TO THE MEMORY OF ONE MILLION DEAD OF THE BRITISH EMPIRE WHO FELL IN THE GREAT WAR 1914—1918. THEY DIED IN EVERY QUARTER OF THE EARTH AND ON ALL ITS SEAS AND THEIR GRAVES ARE MADE SURE TO THEM BY THEIR KIN. THE MAIN HOST LIE BURIED IN THE LANDS OF OUR ALLIES WHO HAVE SET ASIDE THEIR RESTING PLACES IN HONOUR FOREVER.

Bill's voice was a bit shaky by the time he finished reading the message. In a brave attempt to conceal this sentimental lapse he started off on a new tack.

"All this reference to tablets," he said, "reminds me that I had a letter recently from a foundryman who had taken on the job of making some of these castings. He had made a few but they were not up to expectations. He would appreciate some advice on the subject. He wanted to know if it is necessary to make the casting in a loam mold. Is it customary to spray a special fine sand on the face of the mold and then dry it.

(*Continued on page* 196)

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CHICAGO 4 • ILLINOIS

(*Continued from page* 194)

"In my reply I pointed out that in foundries engaged in the production of bronze plaques and tablets, the usual practice varies to some extent depending on the size, shape and degree of ornamentation on the face. Small sizes are molded quite readily in green sand molds. Medium size and large castings are molded in sand, usually skin dried, but occasionally dried in the oven.

"While Albany 00 sand usually is preferred next to the pattern, with any kind of ordinary sand for a backing, many other sands from various parts of the country have been used quite satisfactorily. At one time imported French sand was considered necessary, but in recent years a prominent sand supply house in the United States has developed a synthetic sand practically identical with the French sand.

"I did not know from actual experience how the sand in the man's district would serve on plaques and tablets. From what I knew of the sand in other applications, I would be inclined to doctor it a little with practically any kind of binder material. The finished mold could be sprayed with blacking in which the water contained a small amount of molasses, or any other water-soluble binder. The face of the mold then can be skin dried with an oil or gas torch, or by a charcoal fire in a basket or spread on a plate over the face of the mold. This treatment will produce a firm face on the mold and prevent cuts, scabs and washes.

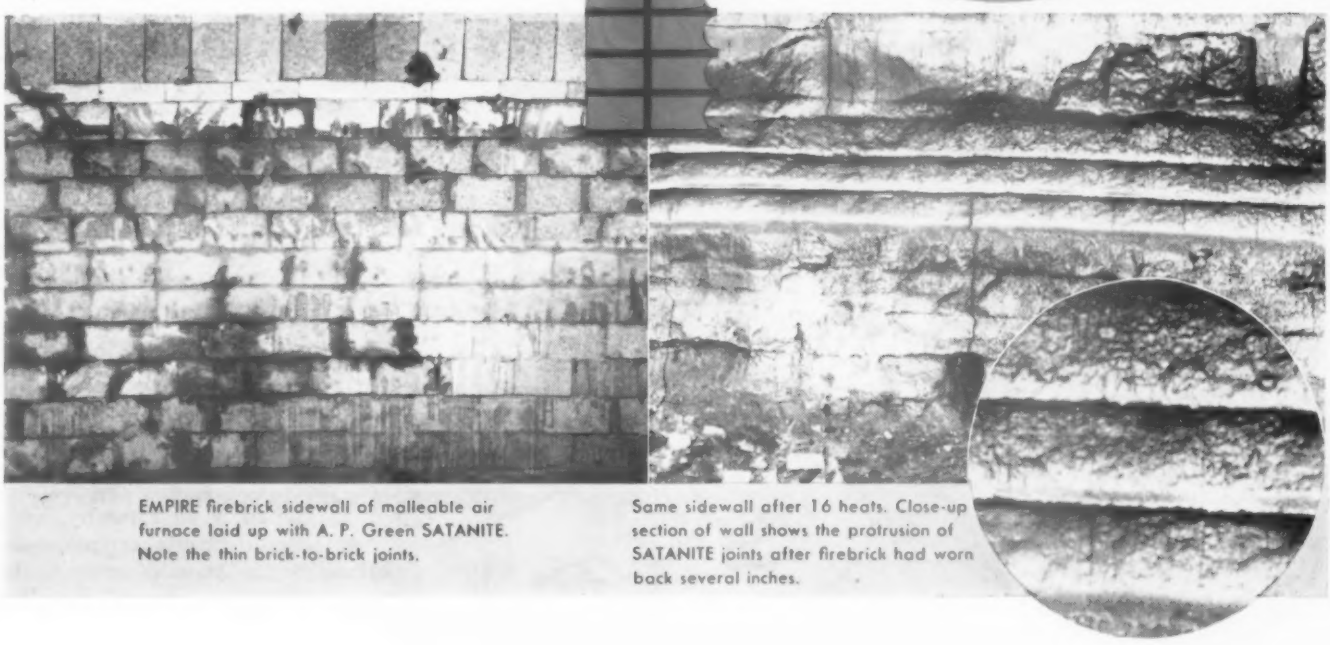
"Method of gating is one of the most important factors in the molding of these thin, large surface area castings. The metal should be introduced through a number of small shallow gates rather than through one or two large gates. A large number of small gates will distribute the metal evenly and more rapidly and will prevent the formation of local hot spots which result in erosion, or, as it is known in the foundry, washes.

"In a somewhat elaborate but highly satisfactory method of gating large bronze tablets the casting is molded horizontally face down in the usual manner and gated on the back through two, three or more rows of small wedge gates. The number depends on the total area of the casting. Small wedges, 1½ x 1½ x ¼-in. thick at the top and tapered to 1/16-in. at the bottom, are placed upright in straight rows on the back of the pattern 8 or 10 in. apart. A

(*Concluded on page* 198)

SATANITE JOINTS PROVIDE
LONGER RUNS,
INCREASED PRODUCTION,
LOWER REFRACTORY COSTS

AFTER 16 HEATS SATANITE JOINTS PROTRUDE BEYOND THE FIRE BRICK SIDEWALLS



EMPIRE firebrick sidewall of malleable air furnace laid up with A. P. Green SATANITE. Note the thin brick-to-brick joints.

Same sidewall after 16 heats. Close-up section of wall shows the protrusion of SATANITE joints after firebrick had worn back several inches.

A large midwestern foundry reports excellent results from furnaces in which A. P. Green SATANITE slag resisting mortar was used in laying up the sidewalls. The above photographs clearly tell the story. A sidewall is shown immediately following installation and after 16 heats.

Note that after 16 heats, although the firebrick attacked by flame, slag and molten metal, has worn back several inches, the SATANITE joints still protrude ⅛ to ¼ inch beyond the surface. This enables the wall to wear back evenly and give added joint protection. Protection that pays off in lower refractory cost, longer runs and increased production.

In malleable air furnaces where sidewalls and bottom are laid up with SATANITE, any part of them can be easily removed for patching or rebuilding. Use SATANITE bonding mortar to increase the life of the lining in all types of malleable iron air furnaces, ladles, electric furnaces, cupolas, and hot metal mixers. Packed in 100-pound multi-wall bags.

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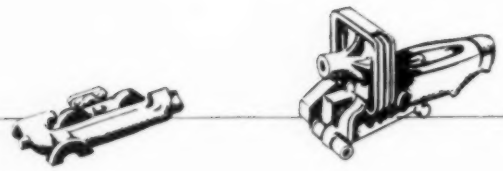

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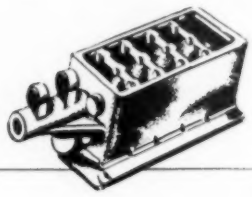

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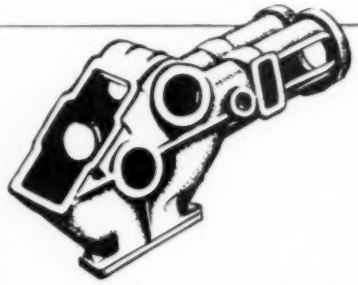
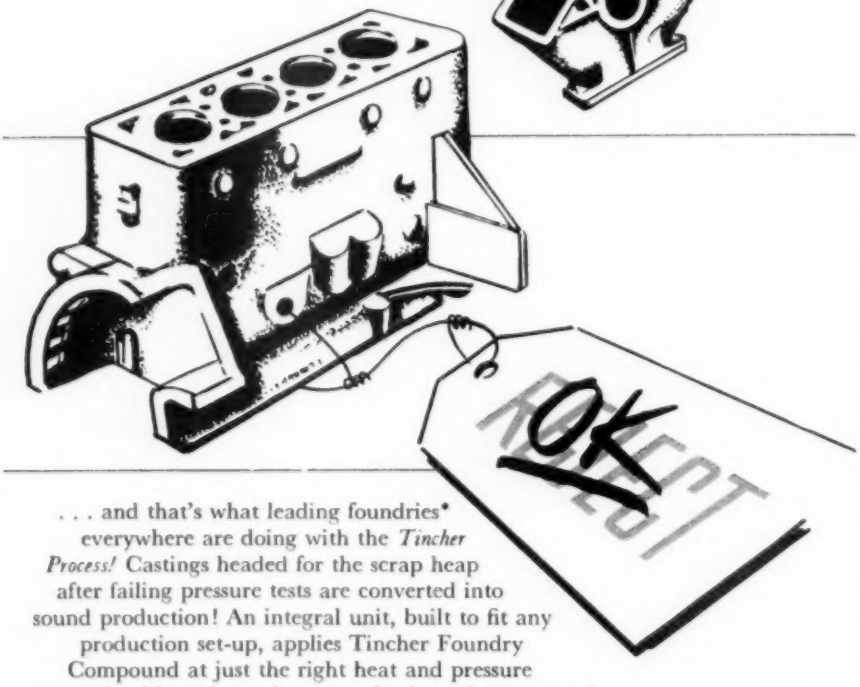
INTO "OKAY FOR PRODUCTION!"





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* Names available on request. The Tincher Process is field tested and proved. See our exhibit at the CHICAGO METAL SHOW, October 23-27.

(*Concluded from page* 196)

thickness of sand is rammed around to hold them in place. A length of 1-in. pipe is laid horizontally on top of each row of wedges and partly covered with rammed sand. The pipes are removed temporarily to permit removal of the wedges. The pipes are returned to place. An upright sprue is placed on each pipe. If considered necessary or advisable, the upright members may be slanted to a common sprue so that all may be served from one basin in which the sprue is plugged until the basin is filled with metal. After the cope is rammed the pipes are pulled through holes in the end of the flask. The holes are plugged with short pieces of stock core.

"In a slightly alternative method small dry sand gate cores take the place of the wedges. In this method the pipes remain in place throughout the entire ramming and thus eliminate any possible minor hazard of crushing, or of small grains of sand falling into the gates.

"Where a mold is gated at the sides or ends, a set gate is preferable to one cut with a gate cutter. In a general way this applies to the gates on any casting. A channel in the sand formed by ramming sand against a pattern is bound to be smoother, firmer and more uniform than a free hand gate cut with a piece of bent tin, copper or brass sheet, even though the gate is slicked with a tool or with the more or less skilled thumb of the molder. In recent years the skilled thumbs are not as numerous as formerly, even if—as superintendents complain occasionally—the thumbs seem to be present in undue proportion to the number of fingers.

"In a simple and highly effective type of runner and gate for small tablets and other thin castings, two half cores with the sprue and gate cavity formed in opposing surfaces are pasted face to face. The complete core is placed upright on the center face of the pattern on the cope side. In size, shape and effectiveness the gate corresponds to the wedge gate formed in green sand on stove plate and hollow ware castings.

"Short and long references to tablet molding practice have been presented in THE FOUNDRY on many occasions. Two articles dealing with foundry practice in the plant of the Roman Bronze Works, Corona, Long Island, on tablets, statuary and ornamental bronze castings appeared in the issues for November and December, 1947."

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Readers' COMMENT

Champions Oxidizing Fluxes

TO THE EDITORS:

Some of the views and recommendations put forward by Mr. R. A. Colton in the article "Melting Practice for Copper-base Alloys" (January, 1950), call for a reply. They are quite contrary to the experience my colleagues and I have had over 20 years most intimate co-operation with foundries in Britain and other parts of the world. Mr. Colton aims in his article to give foundrymen some simple basic rules on how to melt certain nonferrous metals. He overlooks, however, the simplification resulting from use of oxidizing fluxes. His general recommendations include "use no fluxes or covers."

I quite agree with Mr. Colton's statement that nothing should ever be added into or onto metal without a thorough understanding of the reasons for so doing. It is highly desirable that the metallurgical personnel of a foundry are given the necessary information on the composition and reaction of fluxes or compounds for the treatment of metal. Only by taking them into full confidence can really satisfactory metal treatment be evolved. This is a policy which we in Britain have pursued for many years with excellent results.

For tin and leaded tin bronzes Mr. Colton recommends oxidizing melting conditions. It is, of course, universally acknowledged today that most copper-base alloys should be melted under oxidizing conditions. The method of obtaining such oxidizing conditions is, however, one which needs, in my view, further elaboration. Mr. Colton suggests that oxidizing conditions can either be controlled by the flame or by gas analysis. The latter presupposes sufficient competent staff which few foundries can make available. Flame control, on the other hand, is often possible, but it requires an intelligent and watchful furnaceman and a furnace which readily responds to such adjustment. In many foundries it is not possible to guarantee that an oxidizing flame is regularly maintained, and we have found it far more simple and foolproof to ensure oxidizing conditions by means of fluxes containing oxidizing ingredients.

Many foundries are, in fact, melting their tin and leaded tin bronzes successfully with fluxes, not only to protect and save metal, but to obtain a continuous oxidizing condition in the furnace. His recommendation to use no fluxes or covers should therefore read "use oxidizing fluxes." It is, of course, important that the oxidizing flux contains oxidizing compounds of a type which develop the oxygen slowly and especially at high temperatures, so that a continuous development of oxygen is obtained.

The development of fluxes generally—oxidizing, neutral or reducing—has been given considerable thought and attention the last 10 to 15 years and much experience and knowledge has been accumulated. It is possible today to manufacture compounds which will hardly attack the crucibles or furnace linings, yet will produce the consistent results for which they are designed, for instance, metal saving, metal protection, degassing, etc.

Much information on oxidizing melting using oxidizing fluxes has been published by various associations and individuals. I refer particularly to the many papers published in the British Institute of Metals *Journal* (Vol. 70, 1944, pp. 349, and 373) by members of the British Non-Ferrous Metals Research Association, London, England. Their findings will confirm statements made above.

De-Oxidation — Mr. Colton states that the amount of de-oxidant used is to some extent immaterial. We have found that the best way of introducing phosphor copper is by using a strictly controlled amount which is best plunged, especially in the case of crucibles. This we have done for many years by providing foundries with cartridges made from pure copper, containing predetermined amounts of de-oxidants such as granulated phosphor-copper. It was possible to plunge the tube to the bottom and get the reaction from the bottom upwards. As far as the amount of phosphorus to be introduced is concerned, here again most interesting work has been carried out and published in the Institute of Metals *Journal* (Vol. 76, 1949, p. 377). It has been found that thoroughly degassed metal may absorb gas from the mold if the phosphorus content in the alloy is more than 0.02 per cent. This reaction, which is known as "metal/mold reaction" accounts for the sometimes baffling experience of foundries when some castings are sound and others porous. It is therefore desirous to bear this in mind when giving a recommendation on the amount of deoxidants to be used.

Silicon and Aluminum Bronzes — Here again I must object to the recommendation that fluxes or covers should not be used. Aluminum bronzes, particularly, are apt to form considerable surface dross or scum. The use of covering fluxes which will efficiently dissolve aluminum oxide has proved to be a considerable advantage, in not only protecting the metal from unnecessary oxidation but in obtaining a clean and sound casting. We have found that liquid fluxes for crucible melted aluminum and silicon bronze are desirable, while for gravity die-castings modified compounds may be utilized.

Yellow Brasses and Manganese Bronze—I quite agree that manganese bronze should not be poured hot, but we have always found that yellow brasses, particularly for sanitary and household fittings, are best

(*Continued on page* 202)

Says Textbooks Wrong

Most textbooks state that the melting point and the solidification point of a metal are identical temperatures. It isn't so, according to a group of research laboratory metallurgists headed by Dr. David Turnbull at General Electric Co., Schenectady, N. Y. By using special microscope equipment to study behavior of metal droplets, the scientists have found that solidifying points of pure metals are roughly 20 per cent lower than the melting point in terms of degrees above absolute zero.

Impurities cause metals to freeze at their textbook solidification points, which are above the solidification points of pure metals, say the scientists. Metals tested include selenium, bismuth, lead, antimony, cobalt, iron, and palladium.

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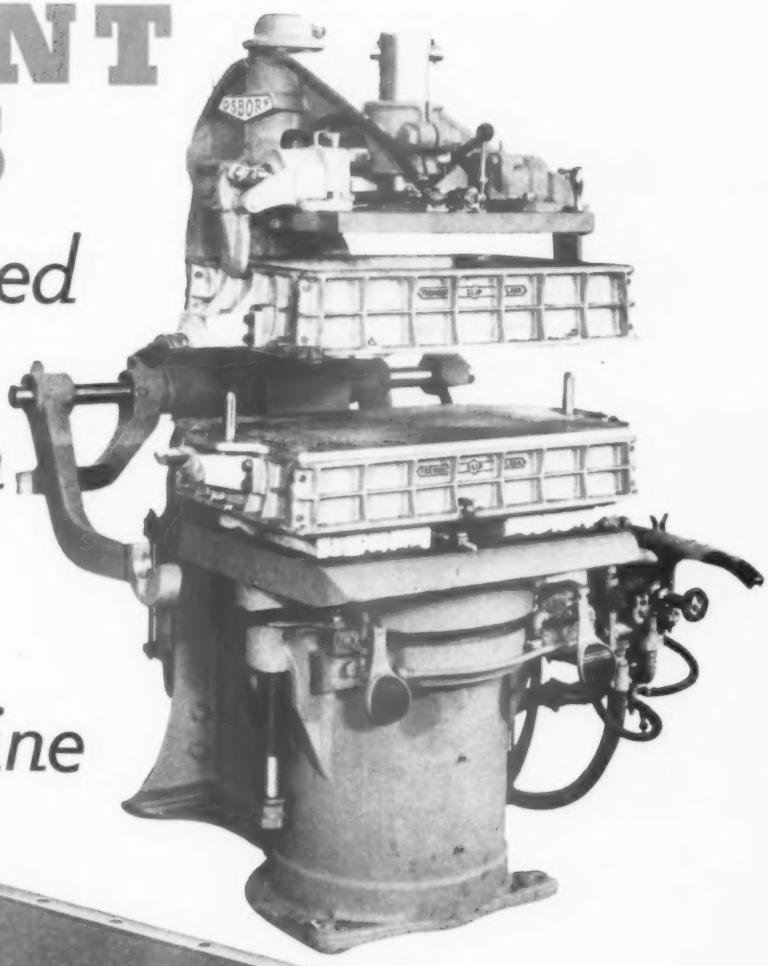

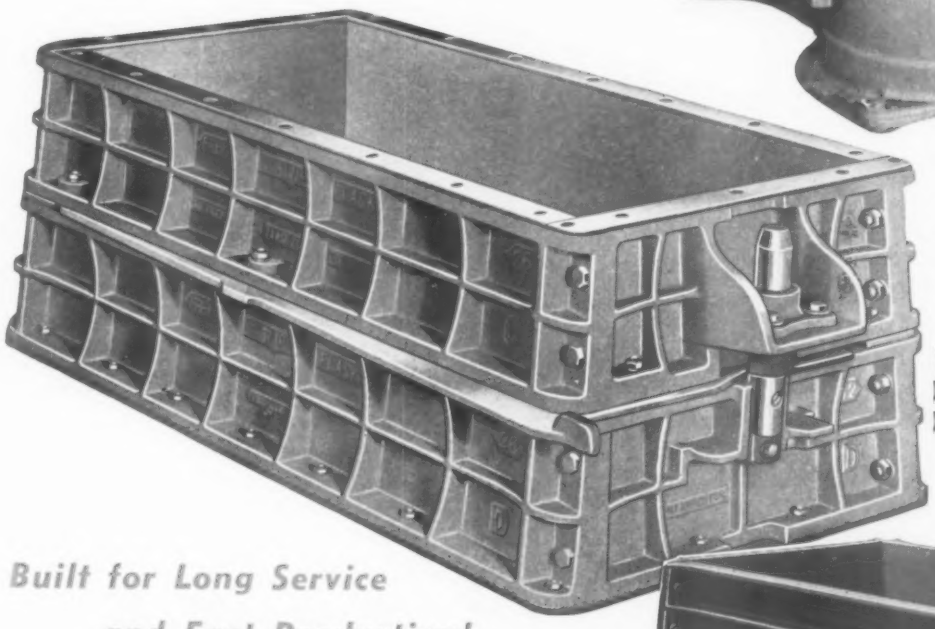

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(*Continued from page* 200)

poured on the hot side. The recommendations (paragraph 4) to add 2 oz of aluminum to 100 lb of metal is, in our view, not a good one. While aluminum will counteract fuming and facilitate running, it will cause considerable trouble when remelting runners, risers and returned scrap. We have seen many castings which fail under pressure due to very much smaller amounts of aluminum than the quantity recommended by Mr. Colton (about 0.125 per cent). As a precaution we always recommend that the remelt from scrap and risers containing aluminum is treated with fluxes which dissolve and thus remove the aluminum oxide, so that the amount of aluminum oxide at any time in the melt, is kept to a minimum.

Yellow Brass—For the melting of yellow brass the use of neutral fluxes is of considerable benefit, because they will stop zinc evaporation during the melting process, and therefore be an advantage from a "smog" and economical point of view. Heavy zinc losses may very materially alter the composition of yellow brass, and thus cause scrap.

Manganese Bronze—For manganese bronze, on the other hand, it is desirable to have a compound which will dissolve any aluminum oxide in the alloy, and prevent the formation of further oxides. Similar treatment to that recommended above for aluminum bronze is therefore desirable.

Nickel Silver Alloys — We have found that the use of an oxidizing cover flux for nickel alloys is particularly useful. Nickel silver alloys generally should be poured hot, the flux forming a liquid blanket which will prevent the loss of zinc to a large extent, and keep the alloy to its proper composition. Thorough deoxidation of nickel-base alloys is most important. The use of manganese is definitely to be encouraged, but a final deoxidation with magnesium or phosphorus is usually advisable. As explained above, the use of copper tubes containing various preweighed deoxidants has been found to be a simple and highly satisfactory method of application. The method described will eliminate the danger mentioned in Mr. Colton's article, namely that any worthwhile residual amount of undesirable element would be left in the alloy.

Finally, I should like to make the following general observation. There is no simple standard treatment with or without fluxes to ensure sound castings. Foundries have different methods, different types of furnaces,

(*Continued on page* 204)

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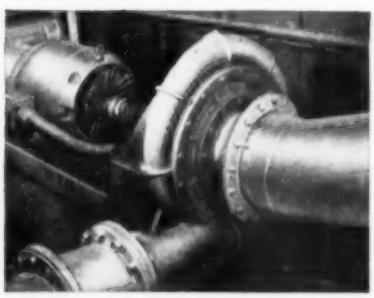

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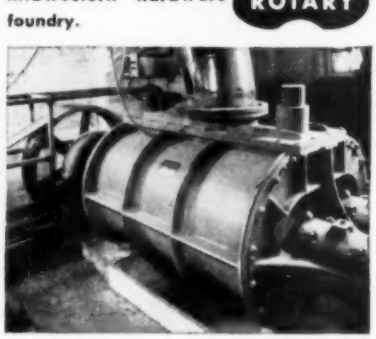

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(*Continued from page* 202)

varying qualities and types of fuel, different molding methods. Apart from these and other major factors, the human element, quite apart from climatic conditions, plays a major part. While there are general recommendations, such as those made by Mr. Colton or myself, which may have their use as a general guide, it should always be clearly appreciated that one recommended method may produce excellent results in one foundry or even on one particular job, while giving a poor result in another foundry or on a different job in the same foundry. We have, therefore, found it to be of the utmost importance to keep in the closest personal liaison with foundries, so that these varying factors can be taken into consideration and recommendations applied, not only for the metal treatment, but for the many other aspects which enter into the production of castings.

In conclusion I hope that Mr. Colton will not misunderstand the comments made, which in no way should be taken as a personal matter, but we feel that your readers should know our methods practiced satisfactorily in many foundries for a great number of years.

Foundry Services Ltd.
Long Acre, Nechells E. WEISS
Birmingham 7, England Director

* * *

The Author Replies

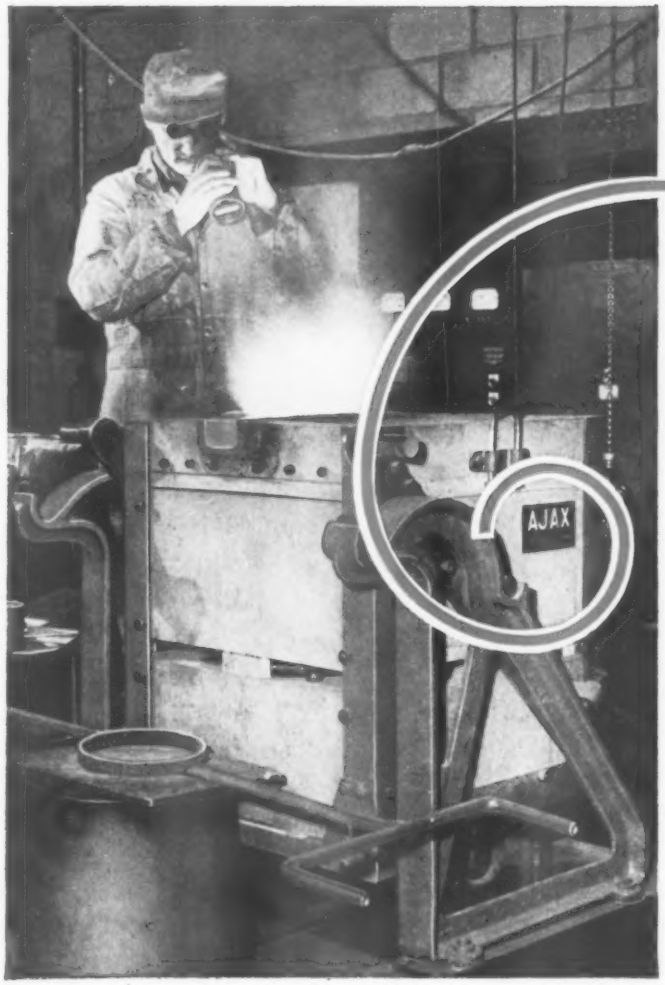
TO THE EDITORS:

In replying to Mr. Weiss' interesting comments the apparent variance in viewpoint may be somewhat reconciled by quoting from the original paper, where I have said, " . . . it is also true that there is more than one melting practice for copper - base alloys that would produce good-quality metal. With a thorough understanding of the melting practice, it is possible to design a number of furnace practices that will give satisfactory results."

It is my feeling that the techniques suggested by Mr. Weiss are an example of what I meant by the variety of methods available for the manufacture of good castings. I believe we both wish to achieve the same objective and merely use different means for attaining it.

I also believe that the discrepancy between our viewpoints is partly due to the fact that we are not always talking about the same thing. I be-

(*Continued on page* 206)



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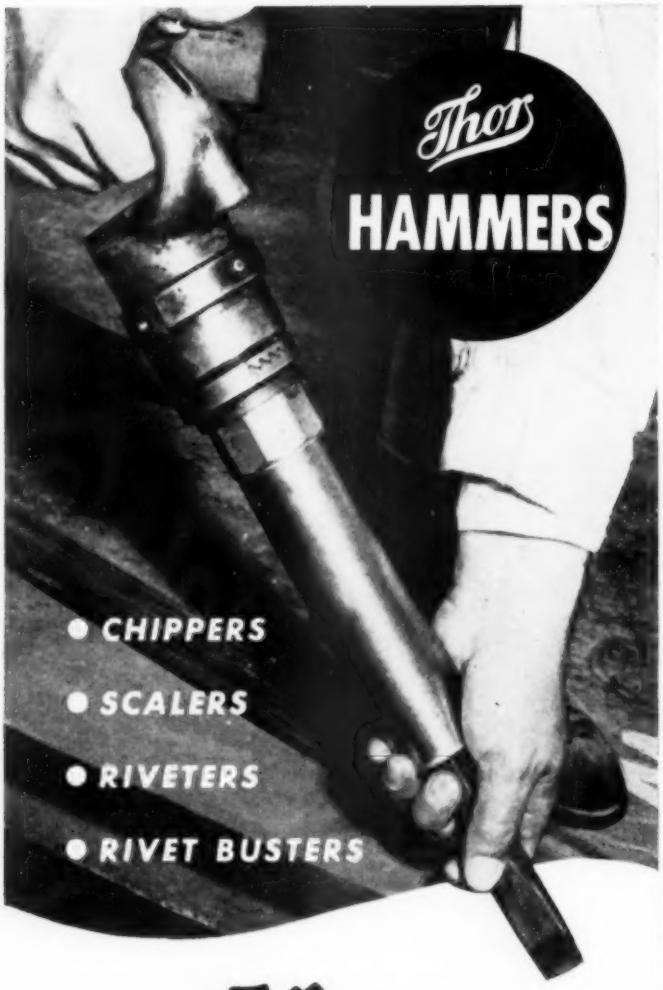

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(*Continued from page* 204)

lieve that there are essential differences in English foundry practice as compared to that used in the United States. To achieve better understanding, I would like to point out some of these differences and at the same time, a few specific comments about Mr. Weiss' suggestions.

Nonferrous foundry practice in the United States, as exemplified by the largest foundries, does not make extensive use of fluxes of any sort. Some foundries use fluxes but there seems to be an increasing tendency to melt without fluxes or covers. Where fluxes are used in the United States, there are practically no cases where the oxidizing technique is deliberately carried out. There is no doubt that this method of controlling atmosphere has merit, but there are relatively few foundries in the United States who have found it advantageous to melt in this manner.

Casting Alloys Differ

Furthermore, one of the most apparent differences in foundry practice between this country and Great Britain is the fact that very little straight tin-bronze, as such, is melted in the United States. Most of the general purpose foundry alloys in this country have a minimum of 2.0 per cent zinc, although there are some castings made from phosphor-bronze. By far, the largest tonnage of alloys cast in the United States contain some sort of deoxidizer. I believe that in their original work Pell-Walpole and associates found that the oxidizing flux technique did not work to best advantage with alloys that contained over 0.5 per cent zinc. While there is no doubt that oxidizing fluxes can be used advantageously with the straight tin-bronzes, the original proponents of the method do not recommend them for use with the alloys most conventionally cast in the United States.

With regard to the difficulty in controlling an oxidizing atmosphere by use of proper furnace practice, I agree with Mr. Weiss that this is not always easily achieved. I believe it worthwhile to point out, however, that in recent years the importance of the melting operation in controlling metal quality, has been emphasized and that notable improvements in melting practice have been apparent. With the diminishing use of coke-fired furnaces it has been possible to establish mechanical controls on furnace burners. Where gas-melting is used it is possible to adjust the burner quite satisfactorily; with oil-fired melting equipment, the use of a proportional mixer is recommended and

(*Continued on page* 208)

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(*Codntinued from page* 206)

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Since the foundryman has realized the importance of controlling his melting operation, he has taken steps to maintain proper oxidizing conditions. I believe it is most indicative of foundry practice in this country that the average foundryman has learned that he can achieve satisfactory melting conditions without the use of fluxes. In some cases, the foundryman finds that he can use fluxes to advantage but in either case it is the foundryman himself who sets up the balance of conditions that controls practice in his shop.

Clarifies Use of Deoxidant

Mr. Weiss makes a statement that in the original paper I have said that the amount of deoxidant used is to some extent immaterial. My recommendations in the paper were quite specific since I am fully aware of the difficulties that can occur in misuse of phosphor-copper. I would like to point out that I said that it is possible to add either more or less than 2 ounces per 100 pounds of phosphor-copper, depending on what is actually *needed*. Each foundryman must achieve the balance of conditions dictated by his overall practice and circumstances. If more phosphor-copper than the 2 ounces normally recommended is needed, it would certainly appear wise to use it. Conversely, if less phosphor-copper is adequate there is no reason to add more. I believe that Mr. Weiss' suggestion of using a measured amount of phosphor-copper is worthwhile; most foundrymen in this country, however, have solved the problem for themselves satisfactorily using readily available phosphor-copper shot.

With regard to the melting of silicon and aluminum-bronzes, it has been our experience that fluxes and covers do not give as satisfactory results as does melting with an oxidizing atmosphere. An inert cover would be of no value whatsoever and we have never found drossing to be a serious problem with these alloys. The tendency of these materials to absorb gases in the molten state is far more important than is their tendency to dross. Through the use of an oxidizing atmosphere over an uncovered metal surface we have obtained best results in handling these alloys.

With regard to the handling of yellow brass, I agree with Mr. Weiss that aluminum can be a serious hazard if used improperly. In this country very few castings are made in yellow brass for use where pressure is a consider-

(*Continued on page* 210)

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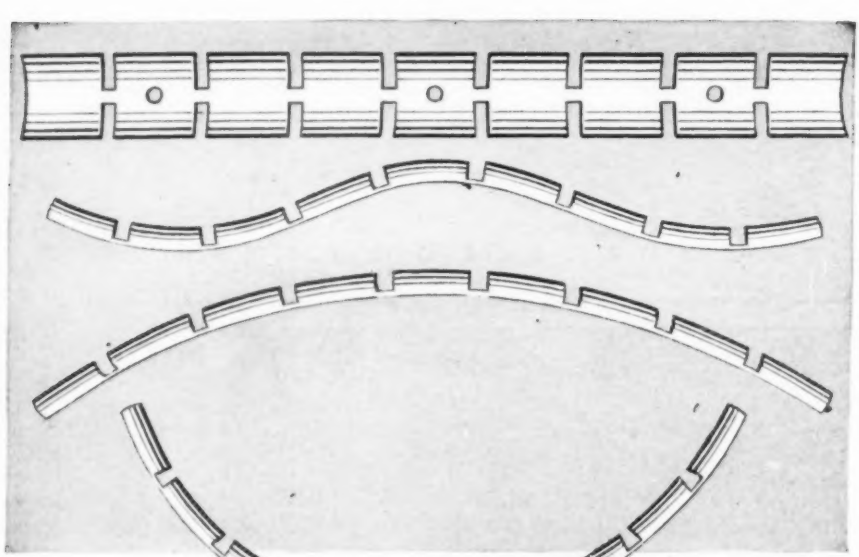

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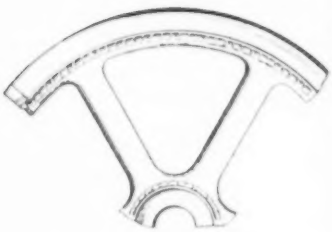

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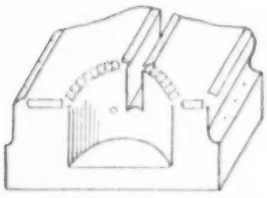

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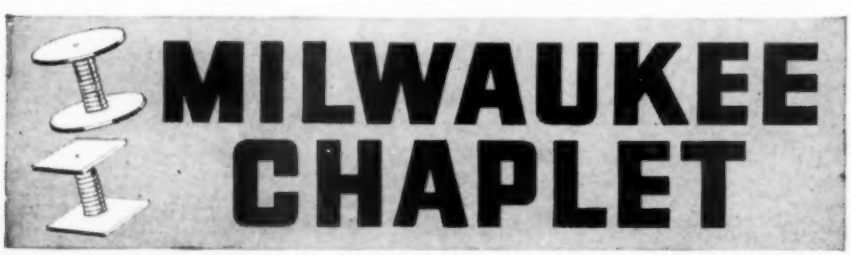


A 5355-2½

(*Continued from page* 208)

ation. Aluminum does improve the castability of the material and can have a desirable effect on the casting surface. I think that as long as the foundryman realizes that he is using aluminum to improve castability and that its misuse may lead to trouble, it is safe to use aluminum with yellow brass. Control of aluminum content in remelt material is important and can be attained by using aluminum-free ingot and controlled aluminum additions.

The practice used with nickel-silver in the United States varies considerably. In general, the use of magnesium is not recommended since it is such a strong dross former. I must admit that there are many techniques for the handling of these alloys and it is possible that the one Mr. Weiss suggests would give satisfactory castings.

I would like to express my appreciation of Mr. Weiss' comments since the more information that foundrymen have the greater will be their progress. I believe there is room for honest differences in opinion as to the methods by which castings are made. I believe, too, that if the average foundryman has sufficient information he will soon learn to select the method and procedure which will give him the best castings and that, of course, is the goal of all of us who work in the industry.

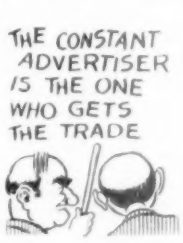
R. A. COLTON
American Smelting & Refining Co.

* * *

Beat the Drum

TO THE EDITORS:

Extensive display of methods, materials and equipment at the recent Foundry Show in Cleveland indicated that the foundry industry is up on its collective toes, fully equipped to produce any and all types of castings in small or in large volume. The long and comprehensive list of papers presented at the various technical sessions showed that foundrymen are perfectly familiar with the practical and theoretical phases.



Viewing the recent convention and exhibition in retrospect, the thought intrudes itself that foundrymen individually and collectively are not taking advantage of articulate propaganda, the great modern force for influencing people in any desired direction.

On a certain memorable occasion

(*Concluded on page* 212)

ONE MOMENT, PLEASE!

Before you turn to the next page, ask yourself this question... "Why haven't we *at least* placed a trial order* for SUPER-ANNEALSHOT?"

*Send for a trial order of SUPER-ANNEALSHOT. If you don't agree that it's the most efficient, most economical malleable shot you've ever used, or if in any way you're not completely satisfied—return the unused quantity for refund, at our expense. You've nothing to lose, everything to gain. So send in your order today, and get acquainted with this finest of malleable abrasives.

METAL BLAST, INC.

872 East 67th Street Cleveland 3, Ohio

(*Concluded from page* 210)

the great apostle, St. Paul, very sapiently declared that even if he had the tongue of an angel, gave all his goods to the poor and so on and so forth, and at the same time did not have Charity, he was nothing but a sounding brass and a tinkling cymbal.

In these modern days and confining these remarks to the foundry field, St. Paul's message might be paraphrased to read, "What's the use of telling each other how good we are?" In the modern idiom what's the percentage in knowing our equipment, methods and materials are perfect if this knowledge is not presented continually and convincingly to potential casting customers? In a word, what's the use of inventing, developing and manufacturing a perfect really high class mouse trap if the mouse-ridden householders do not have your address.

The so-called and probably mythical good old days, when an impatient and eager multitude beat a path to the modest little mouse trap factory in the quiet and bosky dell, are gone where the wild goose goes. The modern mouse trap customer is flagged down at the first whistle stop, the ubiquitous Five and Ten cent store.

Cleveland N. E. VANT

* * *

Seeks Public Relations Data

TO THE EDITORS:

With great interest the undersigned has read your article of November 1949 "What Are Foundries Doing About Public Relations?" I want to express my admiration for the great effort you have done to make this investigation as valuable and comprising as it is.

I found that your article contained so many excellent ideas I thought it ought to be carried further on, for which reason I have prepared a report of the article and sent it to a Danish industrial journal "Erhvervsliv." The journal has accepted this report and I shall send you a copy of the journal containing the report.

Later on I should like to write something special of Public Relations advertising and maybe also of pamphlets. I therefore beg to ask you if you would be so kind as to send me clippings of such advertisements and leaflets, and I should be very glad if you would also send me subjects from other trades using public relations.

I work myself as an advertising manager in one of the greatest factories of the foundry trade in Denmark.

C. E. MEILBY MADSEN
Advertising Manager
De Forenede Jernstberier A/S
41 V. Farimgsgade
Copenhagen, Denmark

Editor's Note: Public - relations - minded foundry executives probably will be rendering Reader Madsen a distinct service by sending the suggested pamphlets and copies of advertisements.

* * *

A Constructive Article

TO THE EDITORS:

The article in the May issue of THE FOUNDRY entitled, "What the Foundry Expects of the Pattern Shop" is one of the most constructive, and basically accurate articles on the subject which I have read in some time.

If you have reprints of this article, I would appreciate receiving several copies as I believe they would be useful at times to back up discussions on the sort of co-operation described.

R. J. PORTER
Superintendent, Pattern Shop
Electric Boat Co.
Groton, Conn.

"No more gassed castings!"

"Real temperature control has enabled us to eliminate gassed castings," writes an Illinois foundry. "Your Marshall Enclosed-Tip Thermocouples have helped us to eliminate both underheating and overheating of metals. This close check allows us to pour our castings as cold as possible, thus doing away with too much shrinkage."

Marshall Thermocouple measure temperatures of molten brass, bronze, aluminum and magnesium quickly and dependably. Their use aids in producing uniformly sound, dense castings best adapted for machining, increasing output, cutting production costs. Made in two types for use in furnace and ladle. Send for free descriptive folder. L. H. Marshall Co., 270 West Lane Ave., Columbus 2, Ohio.

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Clean up castings FASTER with the

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1480-A PNEUMATIC EDGE GRINDER

USES INCLUDE: cutting gates and risers off stainless and chrome vanadium castings, cleaning up welds (especially stainless welds) and foundry finishing operations on monel, stainless steel, etc.

Many grinding and cutting jobs that were tedious and expensive by older methods are made easy and economical with the Cleco 1480-A Edge Grinder. Many users report that jobs which were formerly difficult on a production basis are made easy with the Cleco 1480-A. In some instances the 1480-A paid for itself in less than six weeks.

If you are grinding or cutting monel or hard alloy steel you owe it to yourself to find out what the Cleco 1480-A will do. Give us the particulars of your problem. A Cleco Field Engineer can help you solve it — without obligation.

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Automotive Cast Irons Including Brake Drums

(*Concluded from page 91*)

lower. This is extremely important because of its relationship to the resistance of the iron to heat checking.

Individual alloys have not been specified in the official releases, but the writer's experience has been that the control of this type of structure is best handled with additions of molybdenum and vanadium. The resistance of high-carbon irons containing these two elements to heat checking has been proved in glass molds, reeler plugs and many other applications. It is the author's opinion that the trend in all automotive irons will be toward higher carbons as foundrymen and engineers realize that a sound casting of 35,000 tensile is of greater value than a test bar of 45,000, if the composition of the latter bar does not permit the making of sound castings.

Editor's Note: Principal points discussed in the concluding paper presented at the ASTM symposium ("Applications and Uses of Gray Iron Castings, Including Significance of Various Properties of Gray Cast Iron," by C. O. Burgess, technical director, Gray Iron Founders' Society, Cleveland) were covered in two articles—"When and How To Use Gray Iron," by T. E. Egan, Cooper-Bessemer Corp., Grove City, Pa., and "Designing Castings in Gray Iron," by Mr. Burgess, published in THE FOUNDRY, August and September, 1948.

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and other alloys
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Michigan Conference Being Planned

Plans are progressing for the Michigan Foundry Conference to be held Nov. 10-11 at Michigan State College, East Lansing, Mich. Austin J. Smith, head of the Metallurgical Engineering Department, and C. C. Sigerfoos, associate professor, Mechanical Engineering Department, Michigan State, are co-chairmen of the conference.

Members of the planning committee include: Detroit Chapter of the AFS—Thaddeus Gisczak, American Foundrymen's Society, Detroit, and Robert W. Mason Jr., International Nickel Co., Detroit. Saginaw Valley Chapter—Jim McDonald, Saginaw Malleable Iron Co., Saginaw, Mich., and Don Bowman, Almont Mfg. Co., Imlay City, Mich. Central Michigan Chapter—Robert Dodge, Werner G. Smith Co., Detroit, and Dick Moore, Foundry Materials Co., Coldwater, Mich.

Western Michigan Chapter—Stan H. Davis, Campbell, Wyant & Cannon Foundry Co., Muskegon, Mich., and Ross P. Shaffer, Lakey Foundry & Machine Co., Muskegon. Michigan State Student Chapter — Fred Schwier, Lansing, Mich. Michigan State faculty—Austin J. Smith, Metallurgical Engineering Department; Howard L. Womochel, L. C. Price, C. C. Sigerfoos, and Douglas Harvey, Mechanical Engineering Department, and Russell J. Kleis, head of conferences.

Sand School To Be Held at Detroit

Detroit Chapter of the American Foundrymen's Society, in collaboration with the Harry W. Dietert Co., Detroit, will conduct an evening foundry school at the University of Detroit, Science building, Sept. 18-20. Frank Brewster, sales manager of the Dietert Co., will conduct the classes each evening from 7:30 to 10:30 p.m.

The course includes: Introduction; standardization of equipment; moisture; permeability; toughness; mold hardness and flowability; grain size, clay distribution, density, facing material; green core tests; baked core tests; core collapse, hot tears, pene-

tration pins; hot strength and expansion, sinter, spall, retained strength; rat tails, scabs, mold atmosphere gas; and discussion of individual problems.

Enrollment fee is $1.

Advanced Course in Quality Control

Purdue University has announced an advanced course in Quality Control by Statistical Methods, to be given Sept. 8-16. Designed for those who have had the equivalent of one intensive course in statistical quality control, the course should be of direct benefit to production, design and development engineers, research and laboratory workers, quality control supervisors and executives. Topics to be covered will include review of control charts, significance of differences, linear correlation, acceptance sampling, sequential sampling for attributes and measurements, analysis of variance, multiple correlation, Chi square and use of calculating machines. Enrollment will be limited to the first 50 applicants, cost of tuition $100 per person. Applications should be directed to Technical Extension Division, Purdue University, West Lafayette, Ind.

Announces Casting Design Contest

Gray Iron Founders' Society, 210 National City-East Sixth Bldg., Cleveland 14, is conducting an industry-wide contest in casting design. Object of the contest is to determine the most significant and outstanding example of redesign of a part or component for production as a casting, in place of some other type of construction. All members of the industry are invited to participate. Advertising committee of the society will act as judges of the contest and cash prizes will be awarded for the best and next best example submitted.

Book Review

Fundamentals in the Production and Design of Castings, by Clarence T. Marek, cloth, 383 pages, 5½ x 8½ in., published by John Wiley & Sons Inc. Price $4.00.

Professor Marek, who heads the foundry department of Purdue University, has designed the volume chiefly as a complete text for first and second year college students. The principal aim is to acquaint student engineers with the controlling factors of the casting process so that in designing a cast part to perform a particular function, the design will permit production at the least expense of labor and material. For that reason, stress has been laid on the problems of both production and design.

The first portion of the work considers the general aspects of the casting process, green sand molding, sand and sand control, pattern and related equipment, and cores and their application. Considerable attention is given to production planning and foundry production equipment. This is followed by information on physical and metallurgical properties of cast metals and uses of various types of castings in ferrous and nonferrous metals. The production cycle is completed with data on melting, cleaning and inspection practices.

To emphasize the design factors, chapters are devoted to design for economical molding and design to eliminate defects.

With greater attention being given to foundry practices and products in the training of engineers, this book will fill a pressing need in many technical schools.

AJAX INDUCTION FURNACES

ARE KEPT BUSY PROVIDING ALUMINUM FOR *MILLIONS* OF CASTINGS!

Pouring aluminum alloy from an Ajax Induction Furnace at the Scottdale Foundry, Scottdale, Pa.

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- No flux needed—no mechanical stirring—no segregation occurs, because metal is in constant circulation.
- Costs less than conventional combustion firing—avoids overheating as temperature control is completely automatic.
- Low upkeep—linings average two years of service—almost no down time—lower melting losses.
- Temperature held within ±5° F—metal kept at lowest feasible casting temperature—no danger of overheating.
- Harmful impurities removed—less dross—no iron pick-up—iron impurities adhere magnetically to passage walls.
- High yield of perfect castings—a remarkably low scrap loss that is possible only with induction furnaces.
- No fumes—almost noiseless operation—cooler shops—lower installation and maintenance costs.
- Automatic electric controls require a minimum of attention—less labor than for fired furnaces.
- Requires 30% to 40% less floor space than any other type of induction furnace—heavy steel construction for long life.

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AJAX ELECTROTHERMIC CORP.,
AJAX ELECTRIC CO., INC.,
AJAX ELECTRIC FURNACE CORP.,

Diesel Crankshafts Cast in Gray Iron

(*Continued from page* 97)

removed as soon as the shaft is shaken from the mold to check the "green" strength and hardness. The result of this preliminary test will indicate whether melting and inoculation have been normal, and if not, whether a special thermal treatment may suffice to adjust any mechanical deficiencies.

Such, however, is rarely needed and the castings, after blasting and trimming, are transferred to the heat treating furnaces where they are brought to 700° F and held for 5 hours, regardless of section thickness. This time is predetermined by the composition and the rate of transformation which is independent of the mass. The commonly prescribed 1 hour per inch is a tradition without scientific basis. A judicious rate of heating, however, and extreme vigilance in maintaining an even temperature over the full length of the crankshaft are indispensable, not only to prevent distortion but to establish uniformity in the finished properties. Heat treatment serves a double purpose. It augments the tensile strength from 3 to 8 per cent without significantly altering the hardness, while at the same time it removes primary cooling stresses and avoids postmachining warpage. Any serious distortion that may occasionally occur in the mold is generally corrected by natural relaxation in the stress relief anneal.

After heat treatment, the crankshafts are again shot blasted and placed individually on special stands where they may be easily rotated for final inspection (Fig. 29). At this time also, two additional test bars are removed, one from each end, to sample the sufficiency of the thermal process and the ultimate mechanical properties. The remaining three are left attached and shipped with the casting for the buyer's use. Shipment is made in open cars after coating with a transparent lacquer (Fig. 39).

Radiography is not employed for the routine inspection of individual cranks. Due to the cylindrical shape of the bearings and obstructive metal masses at the connecting webs, pictures are difficult to make and often more difficult to interpret. It is customary, however, to radiograph the pilot casting from each new pattern at all critical regions, or cut it into sections to determine the adequacy of the molding and heading procedure. The method is also used occasionally to explore the extent and significance of a doubtful surface flow.

Engineering Properties and Microstructure — In the green condition, standard ASTM tension specimens cut from the integrally cast test bars and machined to a diameter of 0.80-in. will manifest a mean tensile strength of 62,000 psi and a brinell hardness of 275. After heat treatment the average mechanical properties thus determined will be:

Tensile strength	70,000 psi
Transverse strength	15,500 lb
(2.0 in. round bar on 24-in. supports)	0.40-in (deflection)
Endurance limit	35,500 psi
Modulus of elasticity, static tension	22,300,000 psi
Modulus of elasticity, shear	9,800,000 psi
Brinell hardness*	275±10

* In the range 269-286 the hardness usually remains unchanged after heat treating but will occasionally vary 10 points up or down. Above 300 it will usually decrease.

To test the adequacy of attached coupons for indicating the quality of the metal in the casting itself, both light and heavy crankshafts have been cut up to provide material with which to make comparative determinations for hardness, strength and microstructure. In most experiments of this nature the metal in the casting

· Diameter of shell—12"
· Overall height—13½"

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FOR MIXING SAND IN SMALL QUANTITIES

Your foundry has long needed a Muller of this size. And here it is! Handles mixes up to 7 pounds. Weighs only 85 pounds, so it is easily portable!

The Cincinnati Muller can be used efficiently for laboratory testing of core sand mixes, facing sand mixes and moulding sand mixes. It is also satisfactory for production runs of small quantities of core sand. A Spacer is supplied to lift the Mullers from direct contact with the steel plate — particularly desirable in analyzing moulding sands.

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will be found superior in engineering properties and structure to that of the cast-on test bars, as may be confirmed by a study of the sketch and data in Fig. 30. Although this represents one of the smaller shafts, about 7 ft in length and 1000 lb in weight, it is typical of all sizes with respect to the present comparisons.

All test pieces were dimensioned as given above and in the case of the four integrally cast coupons the centers were turned concentric with the long axis of the rough bars. Brinell hardness values were taken on the ground fracture planes of the broken tension specimens and the photomicrographs shown as Figs. 33 to 38, inclusive, were made on the corresponding surfaces of the opposing fragments. Following is a summary of the tensile and brinell values from both the crank and the attached coupons, all of which, with the exception of Coupon No. 3, had been previously subjected to simultaneous thermal treatment. Coupon No. 3 was tested in the as-cast condition.

——CRANKSHAFTS——

Specimen No.	Tensile Strength	Bhn	Fracture
1	75,000 psi	269	Normal
2	76,200	273	"
3	69,100	259	"
4	69,000	262	"
5	68,600	265	"
6	68,700	269	"
7	71,200	269	"
8	68,500	269	"
9	62,200	259	Evidence of microshrink
10	56,100	265	Normal
11	68,700	269	"
12	69,400	269	"
Average	68,466	266	"

——COUPONS——

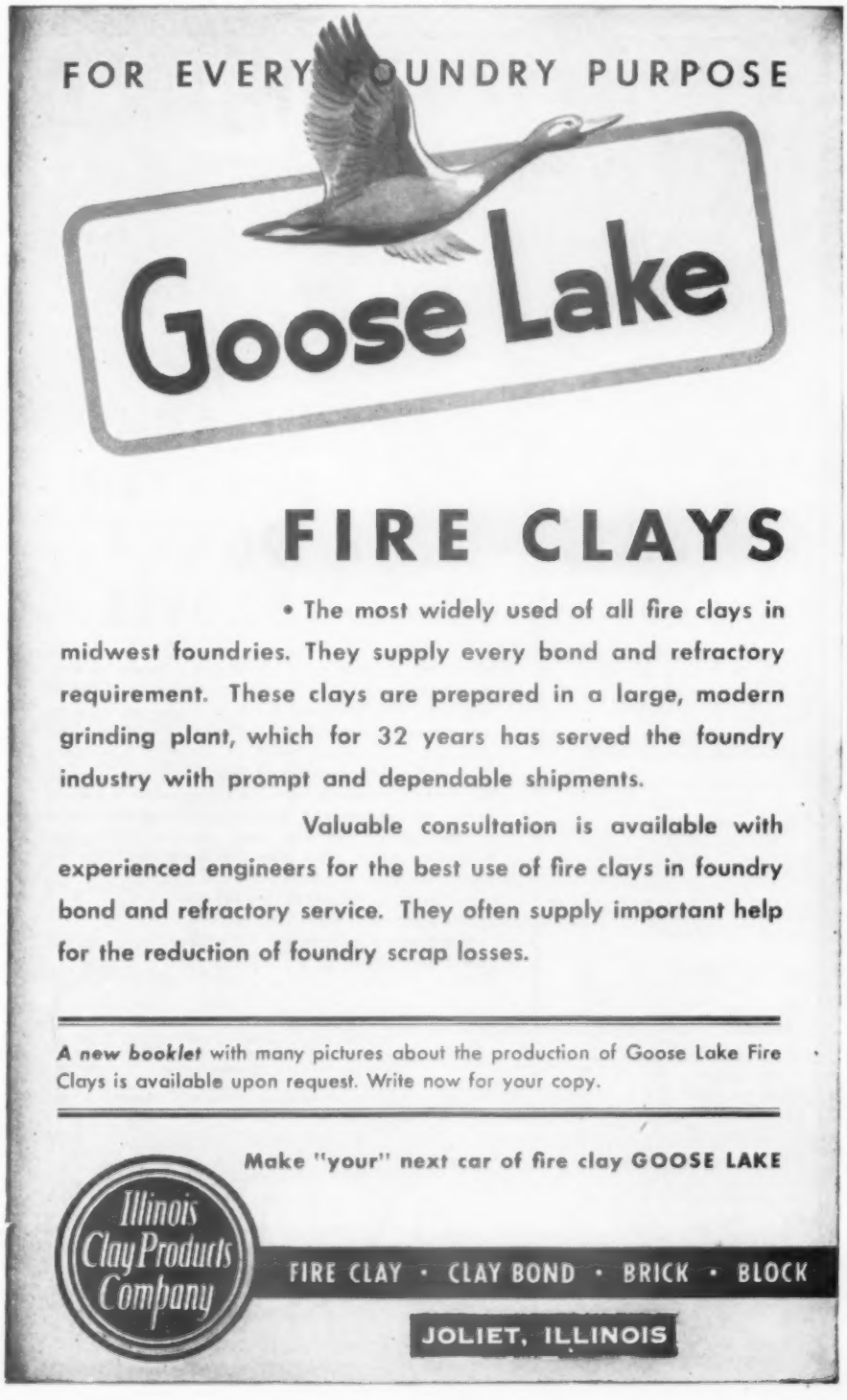
1 (top)	64,700	273	Normal
2	59,600	277	Broke in threads
3*	59,000	277	"
4	63,700	277	Normal
Average**	62,666	275	Normal

* Tested in as-cast condition.
** Does not include No. 3.

From this tabulation it will be found that the average tensile strength of the crank itself is somewhat over 9 per cent greater than that indicated by the test coupons despite the inclusion of Specimens No. 9 and 10, which were abnormally low. The crank specimens are also a little softer and had somewhat better machinability. It will be further noted from the photomicrographs (Figs. 33-38) that the structure of the shaft from one end to the other is entirely acicular while that of the one test coupon examined microscopically was about 50 per cent fine pearlite.

Observing the size and form of the graphite, it is seen that while the pattern presents a random distribution, the flakes are considerably larger than is generally conceded to be associated with high strength. Yet it is our experience that the size of the graphite flakes is not necessarily an indication of tensile magnitudes in acicular iron nor is a dendritic orientation in itself an agent of low strength. Localized microshrinkage and oxide inclusions were the apparent cause of the low strength developed in Specimens No. 9 and 10. A ten-throw crankshaft, 13-ft long with 8-in. bearings and weighing some 2800 lb, studied in a similar manner has manifested similar relationships between cast-on and crank section test specimens.

Conclusion—Such, in broad outline, is one way in which a heavy crankshaft may be made from gray cast iron. There are, no doubt, many other equally successful methods with fundamental differences which would warrant separate and critical examination, but the intent here has been simply to disclose, not to compare. Much informative detail has of necessity been omitted from a summary account such as this and questions involving metallurgical theory have been purposely avoided as out of place in a practical discussion.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Valuable consultation is available with experienced engineers for the best use of fire clays in foundry bond and refractory service. They often supply important help for the reduction of foundry scrap losses.
A new booklet with many pictures about the production of Goose Lake Fire Clays is available upon request. Write now for your copy.
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The essential steps in the procedure have, however, been described and those who have followed to this point will have noted that although we have been considering only the melting and pouring of cast iron, steel foundry practices have been employed throughout. This is due in part to our prior experience with cast steel for cranks and straight shafts of many types but it is mostly because of the derived economies and the improved quality of the end product.

In conclusion, it may not be out of order to say a word about cast iron in general and cast iron crankshafts in particular. In speaking of the latter we say "cast iron" without any sense of umbrage or apology because, as inferred in the beginning, cast iron has attained superior rank to steel, both as cast and forged, in this and similar fields where its peculiar qualities have assigned it preference. Such a proposition does not permit of controversy because, as the author has observed elsewhere:

"Steel and iron cannot properly be compared solely on the basis of the engineering characteristics of *steel* any more than they may be compared solely on the basis of the engineering characteristics of *iron*. To be sure steel exhibits some valuable properties which iron does not possess but which are nevertheless of no value whatever in applications where iron is indicated. Conversely, iron possesses some unique properties which may be completely lost when applied in places where steel would manifest a better engineering balance.

"For example, the static tensile properties and especially the ductile properties of steel fall far into the background in importance in comparison with anti-friction and crackless plasticity when we are thinking about crank-shafts. In this first reference, the bearing lubrication and anti-seizing characteristics of gray cast iron are far superior to those of steel and far more important than unapplied tensile strength and ductility or the ability to be plastically deformed without breaking; whether a crank bends or breaks it becomes equally unserviceable.

"A bar of soft ductile steel may be caused to fail with a brittle fracture if the stress is concentrated in a notch, but because of the random distribution of graphite in properly made high-tensile iron a sudden stress cannot travel along a single plane or in a straight line but will be diffused and distributed in many directions, and unless very severe, will not induce cracks at a localized point which will progress to failure."

Casting Process Is Superior

In addition to the well known but none the less unmatched mechanical and physical attributes which place cast iron in the forefront of present day materials for crankshafts, the fact that it is cast to predetermined shape must not be overlooked. By this recourse the differences in strength occasioned by grain orientation or directional fiber as in forged or rolled products is not incurred. Defects occasioned by the junction of columnar crystals growing inward from abutting isothermal surfaces are not contingent with gray cast iron because solidification proceeds from millions of minute graphite particles throughout the mass forming crystals that are nondescript in orientations and equiaxed.

Machining waste, of both material and labor, is substantially reduced, superfluous weight avoided and, with hollow journals, throws, and end extensions, cast cranks are commonly designed to substitute block forgings having twice the finished weight. One of the great drawbacks to the devel-

(*Concluded on page* 220)

THE OLD WAY
is definitely OUT!
No control when leg is caught in cable
No control when striking objects
NOW THE NEW WAY!
THE STEARNS DOUBLE-SAFE POWER SHOVEL
"DEAD-MAN" SWITCH RELEASE OF HAND STOPS POWER
POWER STOPS WHEN SAFETY STOP TRIPS LIMIT SWITCH
SAFETY STOP!
NO LOSS OF TIME FROM SLACK CABLE
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FOR SHORT STROKES
SAFEGUARD AGAINST OBSTACLES "ON" OR "OFF" BY FINGER-TIP CONTROL
Here's the answer to safe, fast and efficient unloading of bulk materials from box cars—The STEARNS Magnetic Clutch Controlled Power Shovel. A one-man shovel completely controlled by the man in the car, safer operations result . . . when the operator releases his pressure on the "dead-man" switch, the clutch disengages and the scoop stops. A second safety feature prevents accidents beyond the control of the operator — the scoop automatically stops when the safety stop trips the limit switch in the swivel sheave.
Lower unloading costs too for unloading time can be cut up to 30%.
Get the full information on single and double units — write today for Bulletin 250-A.
When operator presses switch in scoop handle, magnetic clutch is engaged and scoop is drawn forward. Release of switch disconnects clutch and scoop is free to be drawn back in car.
Patents Pending
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That's a broad claim. We don't expect you to accept it without substantiation. We hope you will ask us to present our proof. All we ask, is that you let it be on-*your*-job proof. Proof we know you'll believe! The only proof we want you to accept.

Like many production finishing men, perhaps you have always taken shot and grit pretty much for granted. If so, you have a surprise coming, for Hi-Grade Shot and Grit IS different—so superior, in so many ways—you can only appreciate its true value by job-testing the material yourself. That way you get proof of performance you can accept as conclusive. Order a trial quantity today. We'll let results speak for themselves. You'll find they say, "*Hi-Grade is best by test*"—your answer to faster, better, uniform, low-cost blast cleaning, in a nutshell.

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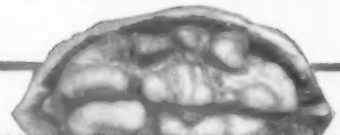


YOU GET TO THE MEAT OF HARD-TO-CRACK BLAST CLEANING PROBLEMS FASTER WITH

HI-GRADE SHOT AND GRIT

- **YOU GET MORE EFFICIENT PEENING AND CLEANING.** Hi-Grade Shot and Grit is uniform, especially processed to withstand repeated strain, stress and wear.
- **YOU GET MORE FOR YOUR BLAST CLEANING DOLLAR—LESS WASTE.** Hi-Grade Shot is famous for its lack of hollows, tails and irregular shapes which do no good, yet cost money. Hi-Grade Grit is free from dust fines and scale. This alone, saves you up to 20% in actual cost *before you even use Hi-Grade Shot and Grit.*
- **YOU GET A LOWERED COST PER TON OF CASTINGS CLEANED** because Hi-Grade Shot and Grit has a longer re-use value. Special alloying and tempering process minimizes impact fractures.

HI-GRADE SHOT AND GRIT MORE THAN MEETS S.A.E. SPECIFICATIONS—SCREENED AND GRADED FOR 100% USAGE

Clayton-Sherman *Abrasives Company*

MANUFACTURERS OF *QUALITY-CONTROLLED* SHOT AND GRIT

Representatives in Principal Cities

3896 LONYO ROAD ★ DETROIT 10, MICHIGAN

(*Concluded from page* 218)

opment of new designs for crankshafts when employing wrought materials lies in the fact that the units must be formed by forging, cutting and related mechanical processes which impose severe limitations on section contour, weight distribution and the avoidance of useless mass. With a casting the only limitations respecting design are those concerned with section uniformity; but since the preferred designs, from the standpoint of stress distribution and functional intent, are usually the best adapted for production as a casting, there is rarely any serious problem in this regard.

Progressive engineers, both in this and other countries are thus economizing with the proven flexibility and fitness of gray cast iron for what is perhaps the most vital component of the diesel engine.

Mid-West Abrasive Co., Owosso, Mich., will start quantity production of a new abrasive grain for grinding wheels and sandpapers about Sept. 1 at its new plant in Owosso.

They RESIST WARPAGE

. . . it's less than 0.1%

Transite Core Plates offer all these advantages:

They speed production

Core makers save trips...handle many plates at one time.

They last longer

Made of fibrous asbestos and cement, Transite Core Plates resist shock...are less likely to crack or break.

They clean easily

Core wash, sand, etc., do not stick as readily as to other materials. Both sides are usable.

They resist corrosion and warpage

Transite Core Plate surfaces stay smooth even after long service. Warpage is less than 0.1%.

They are economical

Low price, low maintenance and long life add up to low cost.

To eliminate green cores and reduce baking time perforated plates are also available.

For full details write Johns-Manville, Box 290 New York 16, N. Y.

Johns-Manville

TRANSITE CORE PLATES MADE OF ASBESTOS

Plants Cited for Eye Safety Work

Eight industrial organizations have received certificates of appreciation from the National Society for the Prevention of Blindness in recognition of their service in helping to promote the Wise Owl Club of America, an eye-safety organization for industrial workers. The citations were presented as part of the National Society's Mobilization to Prevent Blindness, a meeting of industrial and civic leaders, New York, May 24.

Three organizations with foundry departments were included in the eight awardees: American Car & Foundry Co., Electro-Metallurgical Division of Union Carbide & Carbon Corp., and General Electric Co.

Newton Webb, melting foreman, U. S. Pipe & Foundry Co., Burlington, N. J., was inducted into the Wise Owl Club through having prevented an eye injury by wearing safety goggles.

Seeks Comment on Radiographic Work

Persons interested in radiographic testing are invited by the American Society for Testing Materials to submit criticism and comment on a new recommended practice for radiographic testing which has been developed the the society's Committee E-7 on Nondestructive Testing. The proposed recommended practice is an expansion of material formerly included in the now withdrawn methods of radiographic testing E-15.

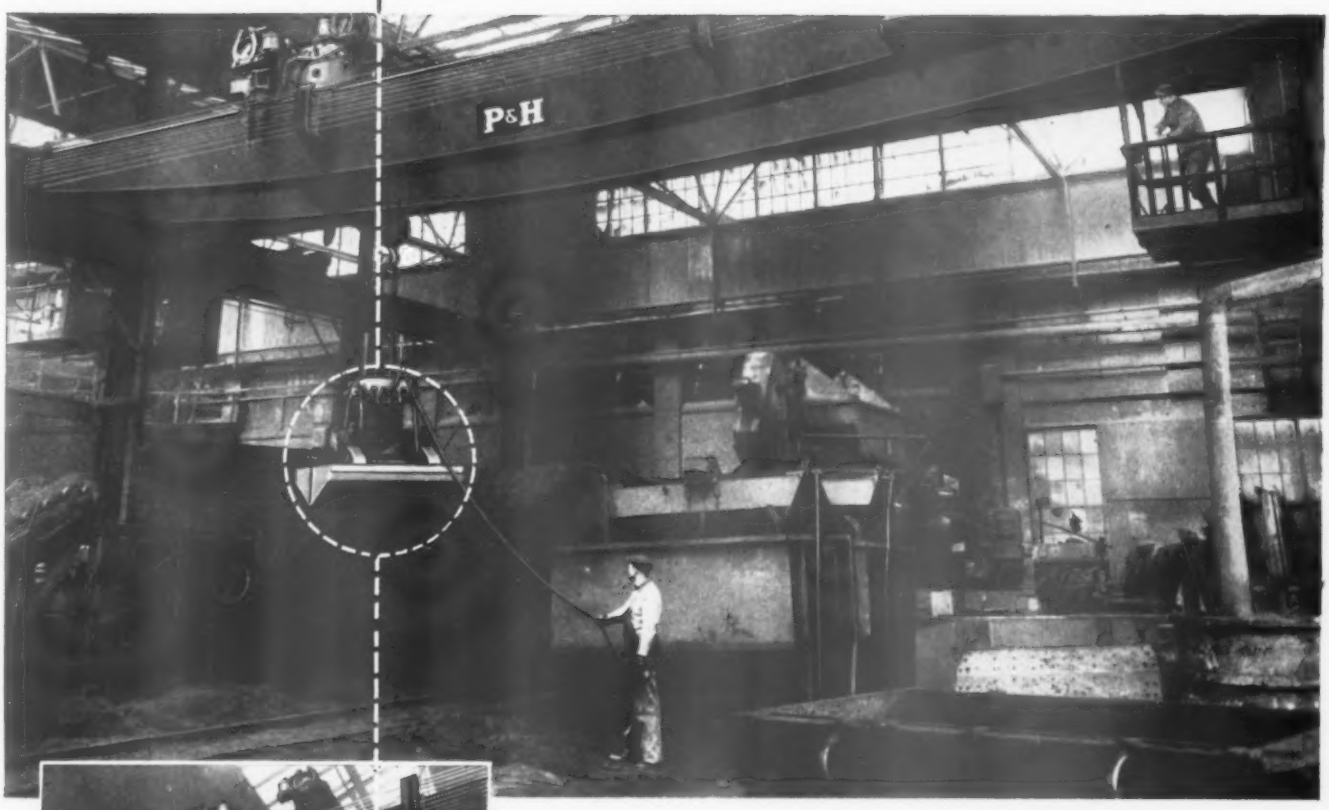
Copies of the new document are available for 50 cents from ASTM headquarters, 1916 Race St., Philadelphia 3. Criticism should be addressed to the chairman of the subcommittee, Dr. H. E. Seeman, research laboratory, Eastman Kodak Co., Kodak Park, Rochester 4, N. Y. Comments must be in by Oct. 16 to be included in the first revision.

Book Review

Constructive Uses of Atomic Energy, edited by S. C. Rothmann, cloth, 258 pages, 5⅜ x 8¼ in., published by Harper & Bros., New York. Price $3.

Leaders of atomic research have joined to present a survey of potential usefulness of that form of energy. The material is written for the layman in nontechnical language and contains articles describing atomic energy in such fields as industrial power, aviation, ceramics, and chemical, biological, medical and pharmaceutical research.

P&H SINGLE LINE GRAB BUCKETS



a *"Natural"* in foundry service!

In a matter of seconds you can attach the P&H Single Line Grab Bucket to your crane hook and it's ready to go to work. It's as simple as that — and it provides easy, accurate one-man operation. It works fast, bites deep, picks up clean.

Here's the fast, easy way to handle all kinds of bulk materials — sand, coke, crushed stone, cinders, etc. It's widely used to unload cars, dig pits, fill flasks, etc. A "natural" for foundry use if there ever was one.

Available in capacities from ½ to 2½ yds. Write for all the facts about it. Ask for Bulletin C-27.

P&H

GRAB BUCKETS
4405 West National Avenue
Milwaukee 14, Wis.

HARNISCHFEGER CORPORATION
ELECTRIC CRANES · EXCAVATORS · ARC WELDERS · P&H · HOISTS · WELDING ELECTRODES · MOTORS

New EQUIPMENT and Supplies

For Additional Information on these Items Use Reply Card—Page 225

(1)—Inspection:

Magnaflux Corp., 5900 Northwest Highway, Chicago 31—Portable, general purpose unit was developed as a moderately small source for magnetic particle inspection to be used throughout plants or in the field. Unit requires only 110 v ac supply line to give ac or dc magnetization, using low voltage, high amperage magnetizing currents. For location of all surface defects such as service fatigue cracks in tools or shafts, the ac magnetization is best and furnishes a powerful demagnetizing field whenever needed. The half-wave rectified dc has been especially developed for location of subsurface defects such as internal cracks in welds, and for cracks on inner surface of cylindrical parts. Portable enough to be carried in a car trunk, integral welded steel frame is supported directly on ball bearing semipneumatic rubber-tired wheels. Accessory compartment in unit contains powder and materials needed, and built-in storage is provided for 30 ft of magnetizing cable supplied and the line cord to reach the nearest 110-v outlet. All operation is controlled by a single switch on an inclined control panel, which also carries a meter that reads in true magnetizing amperes, and red indicator light to show when magnetizing current is available in cable.

For More Details Circle No. 1—Page 225

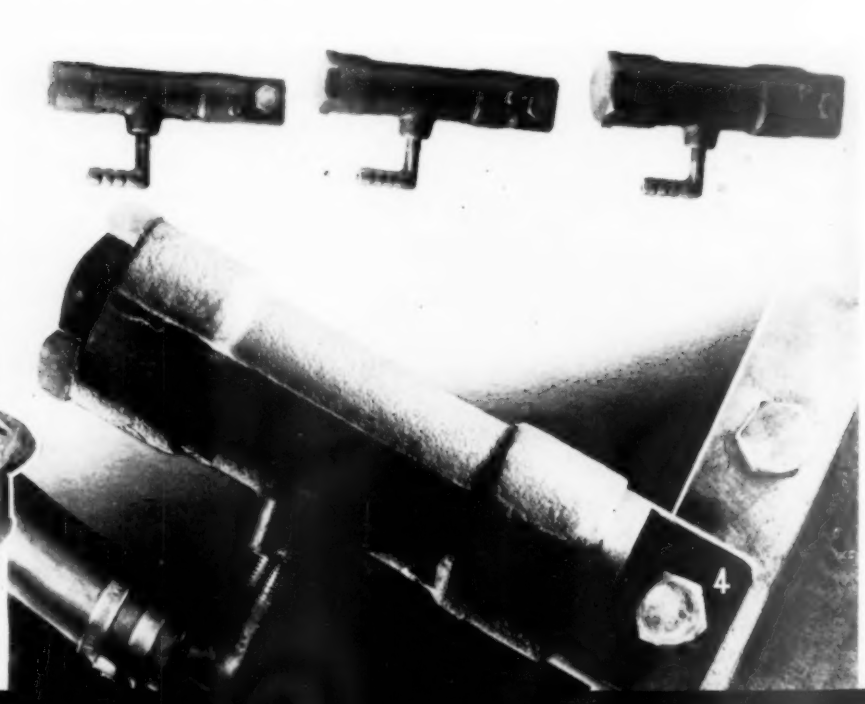
(2)—Aftercooler:

James A Murphy & Co., Fifth & Vine Sts. Hamilton, O.—Cooling unit for those who use small quantities of compressed air, is manufactured in two sizes. Smaller size measures 30 in. overall and cools up to 20 cfm. Larger size measures 48 in. overall and cools 30 to 50 cfm. Designed like the company's larger pipeline aftercoolers, unit is made up of outer steel shell of correct size for required capacity, which encloses a tube nest through which the cooling water passes. Hot air entering cooling chamber is guided slowly about these cooling tubes from intake at the bottom left to the outlet at top center. Separated moisture drops by gravity to the trap below bottom head, from which it is ejected, as collected. Water inlet is shown on photograph at lower right of unit, and water outlet, with sight-drip connection, is shown at top right.

For More Details Circle No. 2—Page 225

(3)—Lifting Magnet:

Ohio Electric Mfg. Co., 5900 Maurice Ave., Cleveland 4—New 55-in. basket type lifting magnet was developed for rough service in steel mills, foundries and plants where operating conditions are unusually severe. It features an outer ring cast in one piece with four integral "ears" which project



beyond the outer ring circumference and protect magnet from damage. Magnet is suspended on four alloy steel chains attached to ears. Lifting coils are wound from wide copper strip for maximum lifting power. They are insulated with a heavy-duty asbestos tape that is said to be unaffected by heat or hard knocks to which a magnet is subjected in skull cracker service or in handling heavy slabs.

For More Details Circle No. 3—Page 225

(4)—Vibrators: SPO Inc., 6448 Grand Division Ave., Cleveland 5—Pneumatically-operated vibrators are suited to such foundry operations as removing matchplate patterns from sand molds, assuring steady flow of material from hoppers, feeding small parts for assembly, and vibrating packaging tables. Featuring full power start and minimum air consumption, the new vibrators incorporate a special bronze alloy cylinder liner said to assure positive and permanent lubrication. Operating on standard 80 psi line pressure the vibrators deliver from 2200 to 6000 impacts per minute, depending upon piston diameter. Speed of vibration can be regulated by varying line pressure. Air consumption ranges from 4½ to 8 cfm. Eight sizes are available with piston diameters ranging from ½ to 2½ in.

For More Details Circle No. 4—Page 225

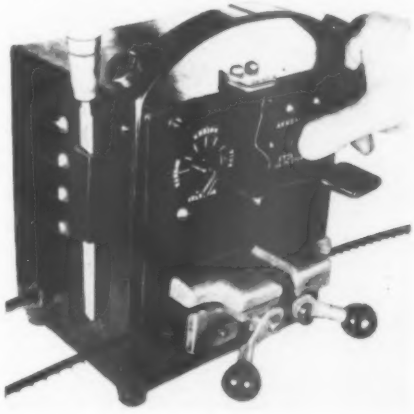
Chaplet Height Indicators: Harry W. Dietert Co., 9330 Roselawn Ave., Detroit 4—Chaplet height indicators help in selecting the correct height of chaplets to hold a core in a large mold. Indicators consist of two telescoping aluminum parts and are available in various heights ranging from ½ to 8 in. In use, the indicators are placed between the core and mold surface at selected points. Setting the core or closing the mold automatically adjusts the indicators to the correct metal thickness. Proper chaplet height for each location may be read from a scale on each indicator as it is removed from the mold.

For More Details Circle No. 5—Page 225

Zircon: Foote Mineral Co., Eighteen West Chelten Ave., Philadelphia 44—Intermediate sized zircon product is said to have high purity and uniformity and to permit close shrinkage control in zircon porcelain and refractory bodies, fast solution in enamel frits and glasses, and fine grained foundry facings. Particle size is between standard milled zircon and extremely finely ground special opacifier grades. It is ground to a trace on 325 mesh with an average 50 per cent passing 10 microns.

For More Details Circle No. 6—Page 225

Band Saw Welder: DoAll Co., 254 North Laurel Ave., Des Plaines, Ill.—Portable, automatic saw



blade butt welder permits on-the-spot welding and annealing of saw blades up to ½-in. diam. Unit measures 7 x 8 x 10¾-in. high and is provided with a 6-ft rubber covered cord to plug into 110 or 220 v, 50 or 60 cycle line. Welder carrying handle also is a holding fixture provided with clamps so that welding flash can be removed in dressing the joint with a hand file. A thickness gage below this holding fixture is used to test proper blade thickness at the weld. As accessory equipment, a blade squaring shear and etching pencil may be mounted on the welder.

For More Details Circle No. 7—Page 225

Goggle: American Optical Co., Southbridge, Mass.—Headrest goggle for gas welders, cutters, burners, brazers and furnace men is adjustable to any head size. Adjusting mechanism, actuated by a twist knob, is enclosed in a fibre tube for insulation and to prevent hair pulling. Perfect balance is claimed, with no overhanging weight. Goggle may be changed quickly to the "off guard" position by a flick of the wrist. Designed to be worn over eyes or personal glasses, the goggle has ventilated, indirect side shields to keep out sparks, metal splashes and stray light rays. Noviweld or Noviweld-Didymium lenses are available in several shades; replaceable cover lenses are provided to protect these more costly filter lenses.

For More Details Circle No. 8—Page 225

Louvers: Swartwout Co., 18511 Euclid Ave., Cleveland 12—Industrial and commercial building louvers consist of heavy-duty frame and overlapping blades, weather-proof in both open and closed positions. Made in adjustable and fixed types, the standard construction material is galvanized steel, although fabrication can be of copper, aluminum, monel or asbestos protected metal. Sizes range from 11⅞-in. high and 12 in. wide to 74¾ x 48 in. for a single unit. By varying the number of blades used, and cutting the frames to suit width requirements, any size wall opening can be fitted with a pleasing pattern of equal size units.

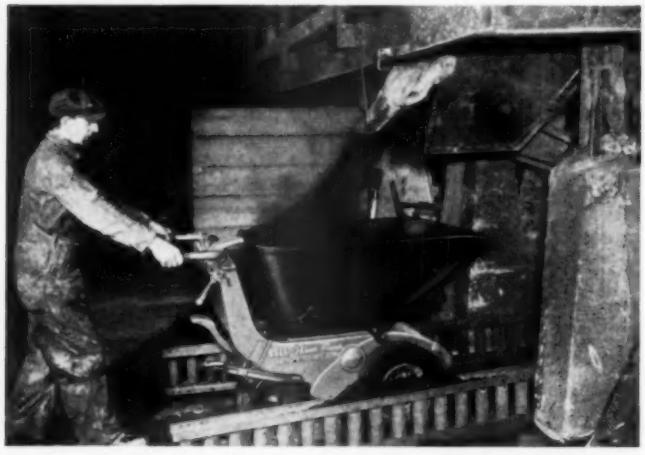
For More Details Circle No. 9—Page 225

Linestarter: Westinghouse Electric Corp., P.O. Box 2099, Pittsburgh 30—New alternating-current magnetic, nonreversing linestarter, designed for either across-the-line starting of squirrel cage induction motors, or as a primary switch for wound rotor induction motors, provides protection of motor, machine and operator. The starter has only one moving part, a "see-saw" lever balanced on a knife-edge bearing. It is said not to jam or stick, and a positive action kick-out spring insures uniform operation. An exclusive unit operating on the deionization principle extinguishes arcs in a half-cycle or less. Insulating parts of cold-molded inorganic material will

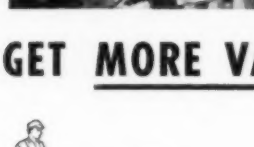
This Prime-Mover is loaded with iron foundry scrap. Easy to use in narrow aisles.

The Prime-Mover handles a wide variety of foundry jobs with increased productivity, reduced fatigue.

The BELL Prime Mover



GET MORE VALUE FROM YOUR MAN-HOURS



Gear driven—no belts or chains.

Engine protected against dirt.

Turns in its own length, 63½"; width 31½".

Converts from bucket to platform without tools.

Eight hours continuous running on 3 gal. of fuel.

Bucket holds 10 cu. ft.

YOU CAN DO IT MANY FOLD WITH

THE PRIME-MOVER!

THIS versatile machine is doing a remarkable job in many foundries. It can do the same for you. If some particular problem of material handling is bothering you—the Prime-Mover can answer that one and additionally help in a number of other ways, too. This rugged unit works outdoors and indoors to keep things moving. Here is a labor saver that has cut foundry handling costs as much as $36 a day. Mail coupon. We'll send you complete information at once.

THE PRIME-MOVER CO., Muscatine, Iowa

THE PRIME-MOVER CO., MUSCATINE, IOWA FY-9

Gentlemen: Please send detailed information on the Bell Prime-Mover in foundries.

Your Name .....

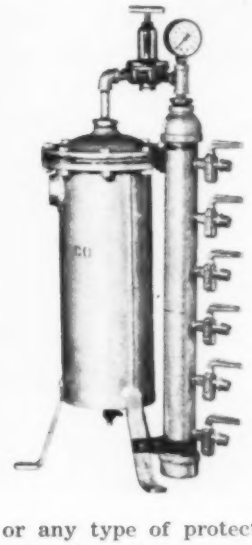
Company .....

City ..... State .....

not carbonize and are shock resistant, it is claimed. Available in NEMA sizes 0 through 4, the linestarter can be applied to all integral horsepower motors up to 100 hp. It is supplied in standard alternating current voltage ratings from 110 to 600 v at frequencies of 60, 50, and 25 cycles for 3-phase, 2-phase 4-wire, and single phase operation.

For More Details Circle No. 10—Page 225

Air Purifier: E. D. Bullard Co 275 Eighth St., San Francisco 3—Air purifier is classified as a portable model having air capacity of stationary models. Six air outlets with standard ¼-in. tap threads permit attachment of any air line fitting to operate all makes of spray guns, air



tools, or any type of protective airline hood or helmet for operator protection. Working pressure is preset and controlled by a pop-off valve installed ahead of the manifold receiver. Capacity of the unit is from 10 to 35 cfm of free air, with a maximum working pressure of 100 psi. Combined chemical and mechanical air filtering is provided.

For More Details Circle No. 11—Page 225

Brinell Tester: R. Y. Ferner Co., 110 Pleasant St., Boston 48—Dwarf brinell press portable hardness tester is designed to give scientifically exact readings even when operated by an unskilled operator. Any means may be used for applying pressure. Exact pressures being applied are indicated over a range of 15.62 kg to 750 kg. The unit uses interchangeable, separately mounted ball penetrators in three sizes—2.5, 5, and 10 mm—to achieve wide range testing. Amount of pressure to be applied and size of ball to be used are designated by a chart. It is claimed that accurate tests may be made on all metals from soft lead to

(*Continued on page* 228)

HELPFUL LITERATURE

50. Colloidal Graphite Coating

Acheson Colloids Corp.—6-page illustrated bulletin 425 shows uses of 'dag' colloidal graphite dispersions in foundries. Heat-resistance and antifriction properties of material allow use for coating of chills, molds, mold cavities and patterns.

51. High-Nickel Alloys

International Nickel Co.—Two illustrated bulletins T-7 and T-9 with 24 pages each are entitled "Engineering Properties of Inconel," and "Engineering Properties of K Monel and KR Monel".

52. Core Oils

Archer-Daniels-Midland Co., Werner G. Smith Div.—8-page illustrated bulletin "The New Linoil 600 Series" gives information on four new grades of core oil which feature strength and economy in use.

53. Foundry Hoods

Claude B. Schneible Co.—16-page illustrated bulletin No. 450 describes various types of Uni-Flo foundry dust, fume and smoke hoods for shakeouts, pouring stations and mold conveyors.

54. Salt Descaling

Hooker Electrochemical Co.—8-page illustrated bulletin 25 is entitled "Hooker Virgo Salt Descaling." Applications, advantages, details of method and equipment used are described.

55. Power Shovel

Stearns Magnetic Mfg. Co.—4-page illustrated bulletin 250A describes power shovels which unload cars quickly and facilitate bulk materials handling. Featuring 'deadman' control in handle of wooden scoop, this dragline type unit is pulled by magnetic clutch controlled winch.

56. Materials Handling Truck

Kalamazoo Mfg. Co.—4-page illustrated bulletin KT-1 describes Kal-Truk materials handling truck which is equipped with 13-hp 2-cylinder air-cooled engine and has capacity of 2/3-yard or 3000 lb.

57. Electromagnet

Dings Magnetic Separator Co.—2-page illustrated bulletin No. B-1802A features Hold-Tite electromagnet for firmly holding steel and iron castings of any shape or weight under swing grinder.

58. Sand Conditioner

American Wheelabrator & Equipment Co.—4-page illustrated bulletin 45 explains how the new Sandmaster cuts, separates, screens and piles foundry sand and thus conditions it for quality molding applications.

59. Dust Control & Recovery

Ducon Co.—12-page illustrated bulletin "Ducon Collectors" discusses industrial dust control and recovery equipment. Efficiency curves, schematic drawings of industrial applications and other data are given.

60. Molding Machines

Johnson & Jennings Co.—4-page illustrated bulletin No. 5105-J depicts and describes portable and stationary Pacemaker jolt rollover pattern draw machines, jolt-stripper or pin-lift machines, plain air jolt machines, jolt squeeze unit and pattern draw machine with automatic adjustable roll-out conveyor.

61. Industrial Oil Burners

Hauck Mfg. Co.—8-page illustrated bulletin No. 456 describes venturi type high-pressure steam or air atomizing oil burner for industrial firing applications in smelting, heat treating, core drying, ladle heating and melting. Cylindrical, conical and flat flame models are available.

62. Chaplets

Smith & Richardson Mfg. Co.—6-page illustrated folder is entitled "Chaplets, Hinge Tubes and Foundry Tins." Perforated, ventilated, tin shell, pipe, Geneva, motor, radiator and double head chaplets are described as well as skim gates and core plates, hinge tubes and special tin forms.

ADDITIONAL INFORMATION?

For additional information on any of the items described under "New Equipment and Supplies", "Trade Publications" or "Helpful Literature" in this issue — simply circle their corresponding item numbers on one of these cards.

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16	36	56	76	96	116
17	37	57	77	97	117
18	38	58	78	98	118
19	39	59	79	99	119
20	40	60	80	100	120

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63. Annealing Furnaces

Holcroft & Co.—4-page illustrated bulletin on "Malleable Iron Annealing Furnaces" describes complete line. Shown also is low-hydrogen gas generator for use in controlled-atmosphere malleable annealing.

64. Power Cranes & Shovels

Michigan Power Shovel Co.—Illustrated bulletins Nos. 100, 601, 1601, C-1601 and 2001 describe and depict various models and types of power cranes and shovels in ⅜ and ½-yard excavator capacities and 6, 8, 10 and 12-ton crane capacities.

65. Blast Grit

American Wheelabrator & Equipment Co.—4-page illustrated bulletin No. 79 discusses applications of nonmetallic silica-free Black Beauty blast grit. This sharp fast-cutting abrasive is noncorrosive and stainless, flows freely and does not pack or harden.

66. Production Methods

Behr-Manning — 8-page illustrated brochure "Proving Ground for Production" describes production methods rooms located in various industrial centers where various grinding and finishing methods can be pretested to determine suitability.

67. Platform Trucks

Kilbourne & Jacobs Co.—4-page illustrated bulletin 3102 gives details of line of general duty platform trucks in ½ to 2½-ton capacities and with rubber-tired or metal wheels and plain, roller or ball bearings.

68. Heavy Industrial Equipment

Wellman Engineering Co.—16-page illustrated bulletin No. 141 depicts wide variety of heavy industrial equipment such as gas producers, coal and ore handling machinery, special cranes, mine hoisting machinery and steel works equipment which company is equipped to manufacture.

69. Refractory Linings

Laclede-Christy Co.—4-page illustrated bulletin 101A gives properties and applications of Metaltite refractory jointing material which affords high resistance to molten metal and slag. How to mix and apply material is explained.

70. Testing Instruments

Steel City Testing Machines Inc.—4-page illustrated form G-1248 is descriptive of line of universal, transverse, ductility, tension, compression and hydrostatic testing machines as well as special testing equipment.

71. Ventilation Equipment

Claude B. Schneible Co.—6-page illustrated bulletin No. 550 explains plan for achieving foundry efficiency and economy through balance of all foundry ventilating air.

72. Foundry Engineering

Lester B. Knight & Associates Inc.—12-page illustrated brochure "Professional Foundry Engineering" is survey of facilities and services offered by these consulting engineers for foundry layout, planning and management.

73. Open Hearth Ladles

William B. Pollock Co.—4-page illustrated bulletin P-450 is descriptive of welded open hearth ladles which in capacities above 70 tons permit enough saving in weight to allow about 6 per cent increase in size of heats.

74. Sand Preparation

Beardsley & Piper Div., Pettibone Mulliken Corp.—36-page illustrated bulletin No. 1220 describes various types of portable and stationary Speedmullor sand mulling machines for all sizes of foundries. Typical layouts, auxiliary equipment and specifications are included.

75. Electric Tiering Truck

Lyon-Raymond Corp.—4-page illustrated bulletin 701 is descriptive of skid and pallet tiering models of SpaceMaker electric trucks which handle 2000 and 4000-lb loads. Truck will tier 48 x 48-in. loads at right angle from 6-ft aisle.

76. Foundry Equipment

Industrial Fabricating, Inc.—8-page illustrated catalog No. 5-48 lists various types of foundry equipment including light, medium and heavy-duty flasks; stub pins and bushings; flask pins; all steel bottom boards and core plates.

77. Exhaust Fans

Clarage Fan Co.—12-page illustrated catalog No. 705 lists six sizes of type CI exhaust fans furnished with either of two wheels for slow or high speed operation. Fans are recommended for handling small volumes against static pressures up to 20-in. water at 70° F.

78. Refractory Concrete

Universal Atlas Cement Co., Lumnite Div.—24-page illustrated bulletin describes refractory concrete made with Lumnite calcium aluminate cement and which is suitable for refractory linings, heat resistant concrete, corrosion-resistant linings and seal coats in coke plants, foundries, steel mills and power plants.

1	21	41	61	81	101
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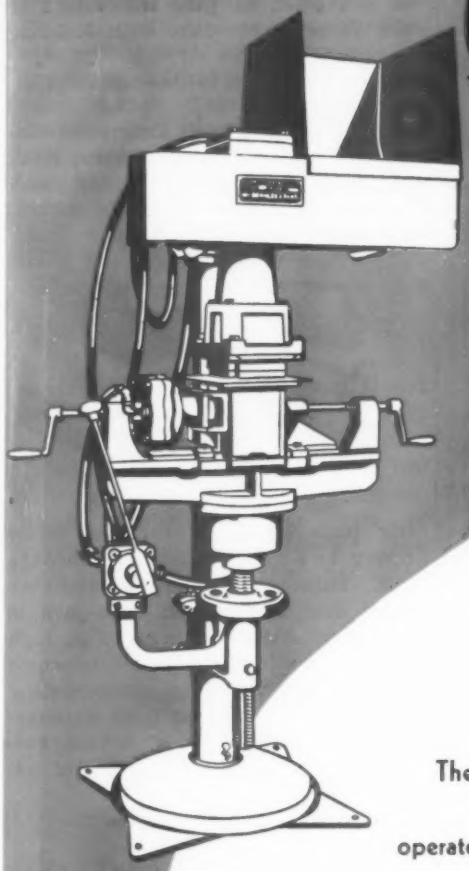
DEMMLER CORE BLOWERS



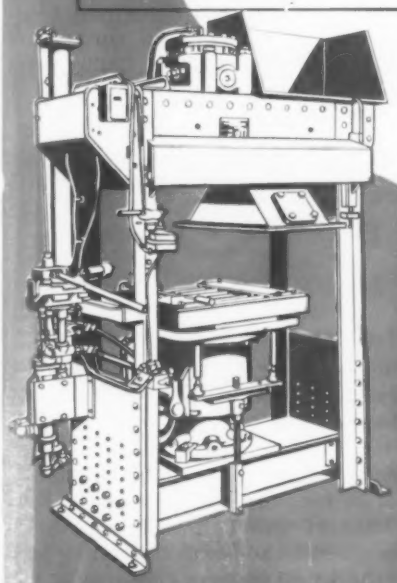
No. 55 CORE BLOWER IS A PROVEN MONEY MAKER

You, too, can boost your profit margin through increased production of high quality small cores. The DEMMLER No. 55 small core blower is ideal for short run jobs—a proven money maker in foundries of every size.

A quality machine throughout, the DEMMLER No. 55 can be counted upon for years of dependable service.

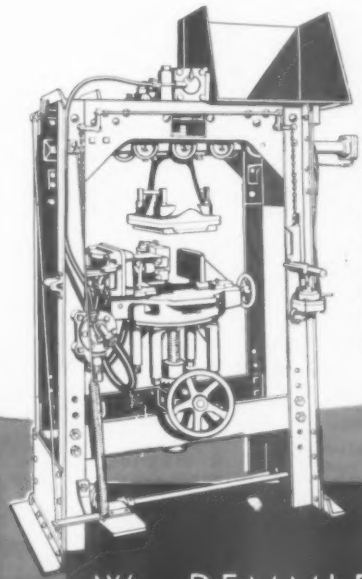
The No. 55 will blow cores weighing up to four pounds, will accommodate boxes nine inches long. Machine has both vertical and horizontal air operated core box clamps, automatically controlled by the same valve that blows the core. Simple in construction and operation, the DEMMLER No. 55 core blower represents one of the greatest values . . . one of the soundest investments in the core blowing field today.

Free illustrated specification sheets on any of the three DEMMLER Core Blowers shown will be sent on request.



DEMMLER No. 2E

For use on cores which can be blown to advantage by attaching top half of core box to blow plate and drawing core on machine. Draws of extreme accuracy assured.



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Here's a truly versatile, general purpose core blower. Blows cores up to eight pounds in weight, has quick job changing features, one of the best known, and liked, machines in the field.

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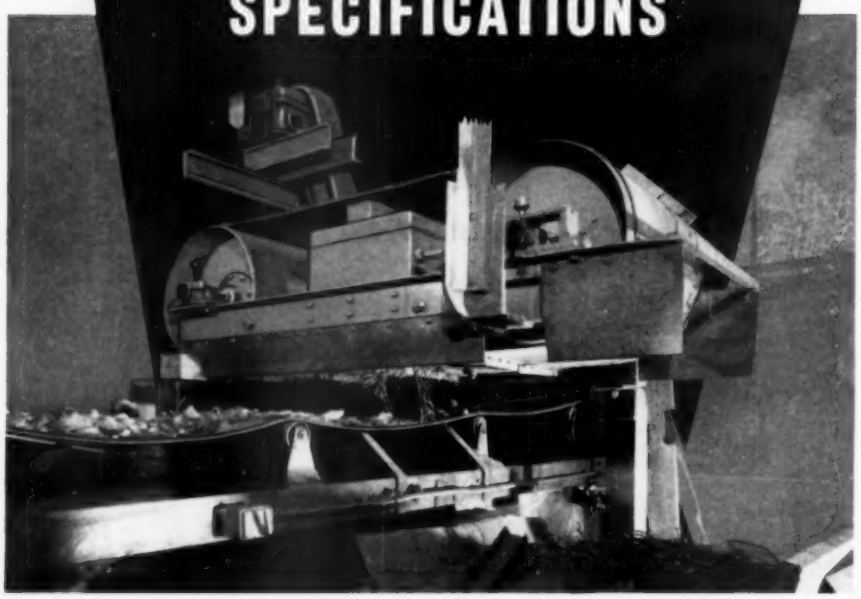

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Demonstrating the power of a Dings Rectangular Magnet, an auto is easily hoisted off the ground.

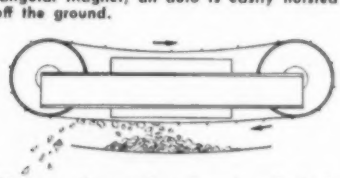

Diagram of operation. Iron is selectively picked up off main conveyor belt, held fast against cross belt which sweeps it out of the magnetic field where it is discharged. Fully automatic.

. . . the Dings Self-Cleaning Rectangular Magnet

FOUNDRYMEN said, "Give me a modern magnet — a magnet that's out in the open where you can get at it for maintenance — and that should be seldom. A magnet which eases belt wear and tear. A magnet that is self cleaning and above all, a magnet strong enough to get *all* the iron where others have failed."

Point by point, the Dings Self-Cleaning Rectangular answers these requirements. The whole operation is simple and completely automatic. The motor driven cross belt carries iron off the side, drops it in a receptacle — no labor involved.

Powerful? See illustration at left. As for operating cost, a 30" magnet consumes only 1000 watts. If you're looking for something new, something superior, something *proven* in a magnet, you've found it here. DETAILS IN CATALOG 301-A.

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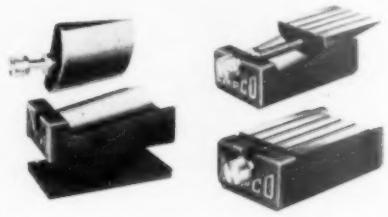
(*Continued from page* 224)

hardened steel beyond the usual brinell limitations. The instrument may be converted to give indications in the Vickers procedure with diamond pyramid.

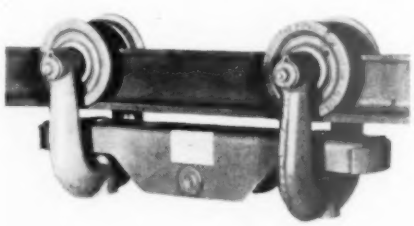
For More Details Circle No. 12—Page 225

Leveling Jack: Enterprise Machine Parts Corp., 2731 Jerome Ave., Detroit 12—Machine leveling jack features vibration absorbing mounting pads developed for use under heavy loads to eliminate creepage and reduce machine maintenance costs due to vibration. The jack is 6 in. long, 3½ in. wide and 2 in. high and has a self-aligning feature which has been improved by compensating for more uneveness of floor while retaining full bearing of lifting surfaces up to maximum height of adjustment.



For More Details Circle No. 13—Page 225

Tramrail Trolley: Forker Corp., 2083 Random Rd., Cleveland 6—Tramrail trolley for use on hand or electric powered tramrail systems, transfer bridges, and tramrail cranes is said to require drawbar pull of only 15 lb per ton to start the load rolling and 10 lb per ton to maintain momentum. Modified steel tube and channel type construction give the unit a high strength-to-weight ratio. Trolley yoke swivels freely on a rolled steel kingpin to eliminate binding of wheel flanges on curves and switches of short radii. Chilled cast iron wheels of 4½-in. tread diam are equipped with precision antifriction bearings and have pressure type lubrication fittings. A straight wheel flange is used to minimize shimmy and to keep wheels rolling in the direction of travel. A slight crown in the wheel tread shifts the rolling load of the wheel in from the edge of the track.

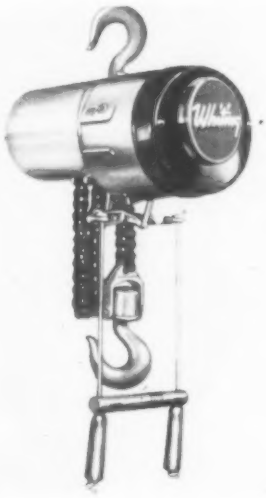


For More Details Circle No. 14—Page 225

Magnetic Pulleys: Eriez Mfg. Co., 906 East Twelfth St., Erie, Pa.—Redesigned permanent magnetic pulleys are said to provide increased magnetic power, lighter weight and greater structural strength than previous models. The new pulleys are made in sizes to carry 12, 15, 18 and 20-in. belts; 24-in. and 30-in. sizes also are available. Belts may be of rubber, leather, canvas, stainless steel sheet, or any other nonmagnetic material. The new design gives uniform flux distribution over full width of the belt, it is claimed.

For More Details Circle No. 15—Page 225

Hoists: Whiting Corp., 15607 Lathrop Ave., Harvey, Ill. — Company's line of electric roller-chain hoists has been redesigned and improved. Hoists retain the totally-enclosed, double-worm-gear drive of previous models. A spring set, shoe type motor brake in which the lining



is bonded to the shoe now is used. The control pull cord has been relocated at the center, instead of the end, of the hoist frame, to eliminate any tendency of the hoist to tip when the cord is pulled. Operating parts have been made more easily accessible for inspection and repair. Hoists are available in ¼, ½, 1 and 2-ton capacities.

For More Details Circle No. 16—Page 225

Lift Trucks: Silent Hoist & Crane Co., 885 63rd St., Brooklyn 20, N. Y.—New series of heavy-duty lift trucks include 5, 7½, and 10 tons capacities. Dual pneumatic traction tires are mounted on a "dead" axle which supports the chassis and fork load, relieving the differential drive of this load. Lifting and tilting hydraulic units are oversize, operating at moderate low fluid pressure. Lifting guides are interlocked with each other to provide perfect alignment and equal distribution of the fork

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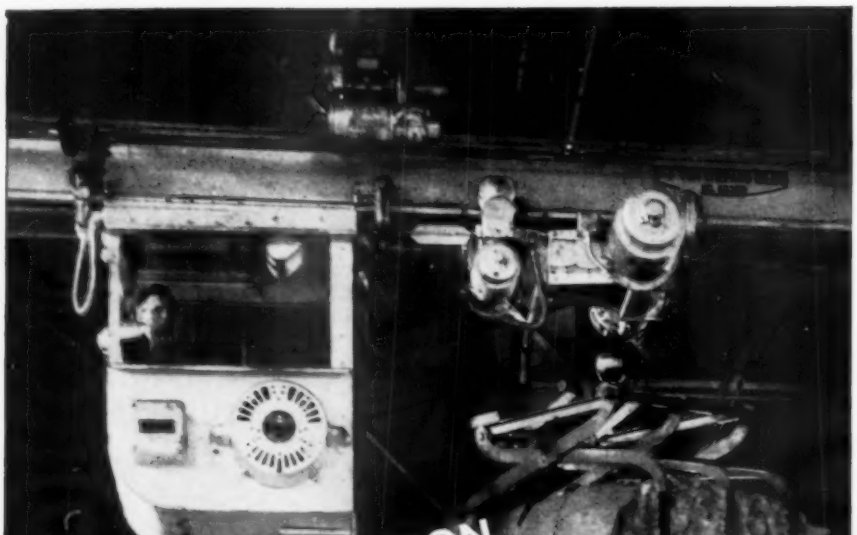

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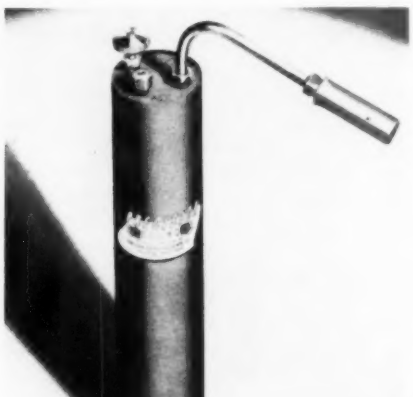
loads. Attachments, such as shovels, special forks and fork extensions, power spreaders, rotary aprons for forks, and special winches and crane booms are available.

For More Details Circle No. 17—Page 225

Torch: Precision Engineering & Mfg. Co., 293 Center St., Saginaw, Mich.—Butane-propane gas torch designed for light brazing, soft and hard soldering, and other general heating operations requiring temperatures up to 2200° F, can be used effectively in any position. It may be filled by any individual or liquid petroleum gas dealer from a bottled gas tank. One filling is said to give 7 hr of continuous operation. Pressure is constant until the 10½ x 2½-in. diam tank is empty, it is claimed. Features of the torch include a gas filter, burner shield to prevent wind from



disturbing flame, universal tip, and finger tip control of pressure valve that permits changing from pin point to a large flame.

For More Details Circle No. 18—Page 225

Air Cleaner, Lubricator: Airlube Inc., 3422 West North Ave., Chicago 4—Dual control system purifies and lubricates low pressure air lines. Unit combines two basic sections with a common regulator and gage. One control, the cleaner, is designed to remove oil, moisture, and dirt for air and gas lines. The lubricator provides finely atomized lubrication for air lines. The cleaner precipitates water and oil by a scrubbing action. It cleans with a series of impinging baffles rather than screens. A transparent, plastic bowl provides a visible check on the dirt entrainment level and carries a petcock for drainage. Unit has a 45-cfm capacity and withstands up to 250 psi. The lubricator regulates delivery of suspended oil vapor in accord with any changes in air pressure. It operates under maximum 125

psi and has a ½-pint-capacity oil reservoir. Cleaner and lubricator can be supplied as separate units.

For More Details Circle No. 19—Page 225

Crane: Construction Machinery Co., Box 120, Waterloo, Iowa—Crane operates off its own power and can be towed behind any truck or tractor.

Aircraft type, swivel wheel mountings and a specially designed rocker arm trailer frame, provide good maneuverability and smooth trailing over rough terrain, it is claimed. This lightweight unit is well suited for lifting, loading and unloading heavy, bulky equipment. The boom acts like a long, high-strength arm, which will lift loads from hard-to-get-at positions.

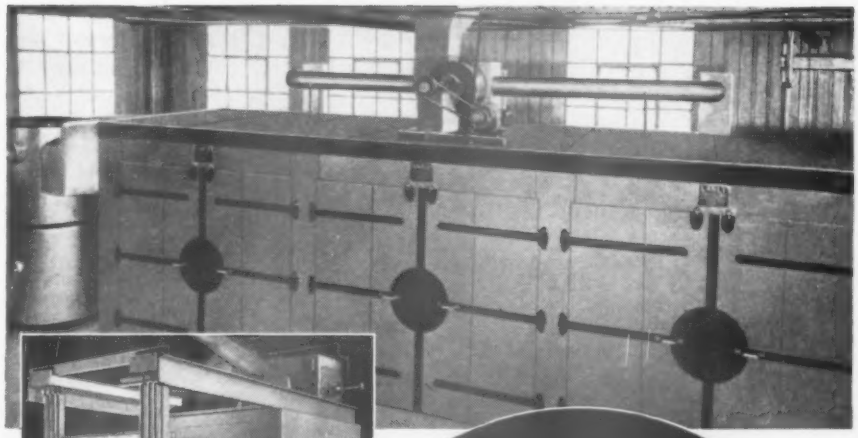
For More Details Circle No. 20—Page 225

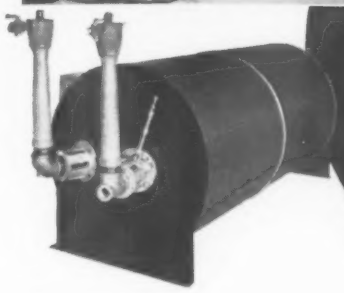
Bucket: Blaw-Knox Co., 2097 Farmers Bank Bldg., Pittsburgh 22—Tip-over and self-righting dumping buckets have been redesigned, using all welded construction in place of the former riveted construction. Buckets are furnished in standard weights for handling foundry sand, ashes, brickbats, refuse, and other

materials. Bucket shown in the illustration has a capacity of 27 cu ft and weighs 760 lb.

For More Details Circle No. 21—Page 225

Indicating Pyrometer: Wheelco Instruments Co., 847 West Harrison St., Chicago 7—Indicating pyrometer for flush and surface mounting is designed for those applications where size of the heating





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equipment or space limitations demand use of a small, sturdy and economical instrument. The high-resistance "edgewise" movement with Alnico V magnet and wide open mirrored scale is fully compensated and enclosed in a dustproof housing, measuring 7½-in. wide, 5 in. high, and 6¾-in. deep.

For More Details Circle No. 22—Page 225

Belt Conveyor: Sage Equipment Co., 30 Essex St., Buffalo — Horizontal belt conveyor comes in standard units to make up any desired length or width. Units consist of a drive section with motor and

control equipment, tail end with 4-in.-diam crowned face tail pulley and tracking idler, "H" type stands with return idlers, choice of belt, and standard 10-ft sections of roller or slider bed conveyor. Belts available are 8 to 36 in. wide in increments of 2 in. and are offered in various types including solid woven cotton, stitched canvas and rubber covered. Drive unit includes a gearhead motor with 10-in.-diam pulley. Standard speed is approximately 50 fpm and may be increased or decreased as desired. A variable speed drive also is available.

For More Details Circle No. 23—Page 225

Core Wash: Titanium Alloy Mfg. Division, National Lead Co., Hyde Park Blvd., Niagara Falls, N. Y.—New core wash, resistant to metal wetting and metal washing, consists of 100 per cent milled zircon sand base with suspending and adhesive bonds. A feature claimed is that it stays in suspension when mixed with water; another is that its fusion temperature is well over 4000° F. It can be applied by brushing, spraying, or dipping. The core wash has been used satisfactorily on an experimental basis by foundries producing stainless, plain carbon steel, iron, and bronze castings. It also may be used as a bonding agent with an equal amount of sand to make small cores when low permeability is desirable; no other bonding agent is necessary. It has been used successfully as a core paste to

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Yes!... with this Gordon & Campbell PERMTESTER

All the advantages of controlled permeability in foundry sands are available with the PERMTESTER—simple, dependable, and convenient to use. Recommended for routine foundry production control and for laboratory investigation of new material and procedure.

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Core Hardness Tester Direct reading gives accurate hardness test in a few seconds.

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Sand Mixer For thorough preparation of sample core-sand mixtures.

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Each of these testing units was designed to conform with the recommendations of the Committee on Foundry Sand Research of the American Foundrymen's Society.

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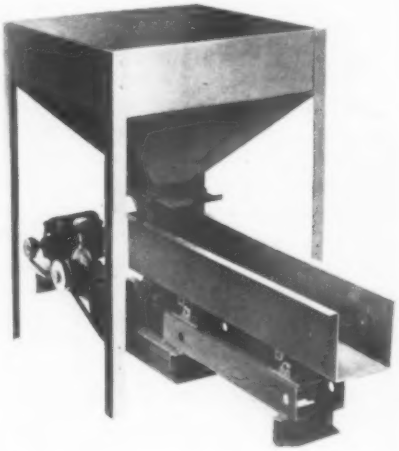
bind cores together and as a mudding compound to patch seams. Cores thus treated can be stored for future use; the core wash is said not to pick up moisture. When used as a coating for chills in molds it prevents fusion and sticking.

For More Details Circle No. 24—Page 225

Electrodes: Eutectic Welding Alloys Corp., 40 Worth St., New York 13—Two new electrodes for welding cast iron are available. One for "cold welding" is said to require less amperage for operation than previous types. Additional claims are that spatter is nonexistent and the flux can be brushed away from the metal. Deposited metal is said to be dense, free of porosity and cross checks, and to have good machinability. Tensile strength is 50,000 psi; hardness is 150-200 brinell. The other electrode is of iron alloy said to produce welds with strength of 60,000 psi and hardness of 210-250 brinell plus a close color match with cast iron. It is said to work satisfactorily on corroded or rusty iron.

For More Details Circle No. 25—Page 225

Vibrating Feeder: Free-Flow Co., 1530 North Gordon St., Hollywood 28, Calif.—New line of vibrating feeders and conveyors of the mechanical vibration type has a positive action said to insure uniform conveying speed regardless of load. Through patented balanced, pendulum construction, action and the reaction are confined to the machine itself, and not transmitted to the building. Features claimed include self-cleaning to the last particle, accurate control of feed, low power consumption, and quiet operation.



Hot or cold materials of any size or shape can be conveyed horizontally, around corners, and up inclines, it is said. The units can be made in any length using a single drive. Troughs can be furnished in any suitable material and may be open or enclosed.

For More Details Circle No. 26—Page 225

SCREENS AND CLEANS BETTER WITH LESS TIME AND COST!

COMBS "V" Gyratory RIDDLE

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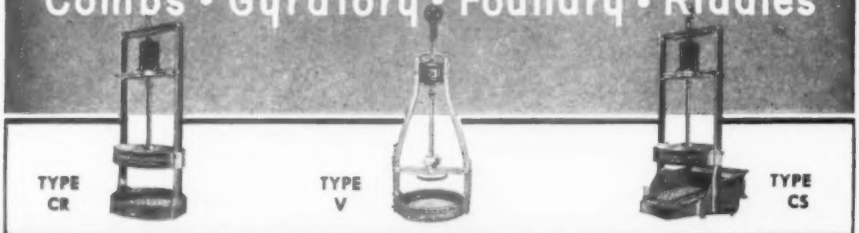

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Rapid Analysis of Silicon and Aluminum Bronzes

By C. GOLDBERG
Chief Chemist
New England Smelting Works Inc.
West Springfield, Mass.

A STUDY has been made of methods of analysis for elements usually present in silicon and aluminum bronzes and, because the final scheme of analysis is more rapid than usual, without loss of accuracy, it is felt that it may be of interest and aid to others.

Although the literature contains many references to the analysis of silicon and aluminum bronzes, we were unable to find any reference to use of a single sample for the determination of aluminum, silicon, iron, nickel, manganese, tin, copper, lead and zinc. The advantages of using a single sample for complete analysis of the alloy are the saving of time in weighing, handling, etc., and the saving of material. Occasionally, too, only a very small amount of material is available for analysis.

An outline of the procedure adopted is as follows: a 1-gram sample is dissolved with nitric acid and the tin oxide (containing traces of antimony, arsenic and phosphorus oxides) is filtered off. The residue is dissolved in sulphuric acid and the tin determined iodometrically[1]. Perchloric acid is added to the filtrate and the solution taken to strong perchloric acid fumes. The silica is filtered off and ignited. The filtrate is made up to a definite volume and aliquots taken for the colorimetric determination of iron and nickel (after copper is removed by zinc displacement) and manganese by the silver nitrate — persulfate method. A large aliquot is used for the electrolytic determination of copper and lead (the lead is subsequently corrected for manganese dioxide deposition).

Aluminum is determined in the filtrate from the electrolysis by precipitation as the hydroxide, along with iron hydroxide, and ignition to the oxides. The known iron is calculated to the higher oxide and deducted from the combined iron and aluminum oxides. Zinc is taken by difference.

It will be noticed that no special equipment other than the machine for electrolysis is used and that the reagents are common ones; the use of a mercury cathode cell for the separation of all elements but aluminum is not necessary.

The accuracy of silicon determinations with hydrochloric, sulphuric and perchloric acids was tested and the latter acid found to be best, as shown in Table I. Hydrochloric acid dehydrations were consistently low and the silica determined with sulphuric acid had, of course, to be corrected for lead. The use of sulphuric acid also makes necessary a waiting period for the cooling of the solution to room temperature before water may be added.

The procedure for the colorimetric determination of iron, published elsewhere[2], has been slightly modified and the range of the colorimetric method for nickel[3] extended to cover the amounts of nickel found in the alloys considered here.

The testing procedure is as follows: Weigh a 1-gram sample of sawings or fine drillings and transfer to a 150 ml beaker. Add 10 ml CP HNO_3 (1:1), cover the beaker and heat on a steam bath to solution and expulsion of all nitrous oxide fumes. Add 50 ml distilled water and boil the solution on a hot plate for 30 minutes if the tin content is known to be below 0.50 per cent or for 15 minutes if the tin content is higher. Remove the beaker from the hot plate, wash down the cover and the sides of the beaker with distilled water and filter the tin oxide (plus Sb, As and P oxides) through a No. 42 Whatman or similar filter paper.

Wash twice with hot 1 per cent CP HNO_3 solution. Since tin oxide begins to re-dissolve, if the temperature falls below 60° C, it is important to keep the solution, during filtration, above that temperature. Transfer the filter paper and residue to a 500 ml Erhlenmeyer flask and add 15 ml concentrated CP H_2SO_4. Heat the solution over an open flame (hood), while keeping the flask in constant motion to avoid spattering, until strong sulphuric acid fumes are evident and the acid refluxes down the neck of the flask. Let cool 5 minutes and add, dropwise, carefully, concentrated CP HNO_3 to oxidize the carbon from the filter paper. Then fume again to strong sulphuric acid fumes. Let cool 5 minutes and carefully cool the bottom of the flask with faucet water, then the sides. Add, slowly, with swirling, 200 ml distilled water. Add the reductant for

TABLE I—Silicon Determinations

(Other elements in alloy—Cu 96.00, Fe 0.10, Ni 0.08, Zn 0.93)

Sample	HCl	H_2SO_4	$HClO_4$
1	2.80[a]	2.92[b]	2.90[c]
2	2.74	2.91	2.91
3	2.76	2.92	2.90
4	2.81	2.93	2.89

a. Sample dissolved with HCl and 30% H_2O_2, taken to dryness.
b. Sample dissolved with HNO_3, taken to H_2SO_4 fumes.
c. Sample treated as in text of this article.

TABLE II—Analyses of Typical Alloys

Alloy	Cu	Pb	Sn	Fe	Ni	Al	Si	Mn	Zn
1	95.60[a]	0.05[b]	0.51[c]	0.75[d]	0.40[e]	None[f]	2.80[g]	0.40[h]	0.09[i]
Single sample	94.98	0.049	0.51	0.76	0.41	...	2.80	0.39	0.10
2	96.50	0.02	0.33	0.45	0.10	...	1.67	0.50	0.44
	96.53	0.03	0.31	0.45	0.11	...	1.68	0.49	0.40
3	81.10	...	0.04	2.20	5.20	10.26	0.20	1.00	...
	81.12	...	0.04	2.15	5.17	10.30	0.21	1.00	0.01
4	90.00	...	...	0.01	...	9.98	...	0.01	...
	90.00	...	...	...	...	10.00	...	0.01	...
5	92.00	...	...	0.02	0.02	7.97	...	...	...
	91.95	...	...	0.015	0.02	8.00	...	...	0.015
6	86.50	0.01	...	3.50	0.50	9.40	...	0.08	...
	86.48	...	...	3.53	0.50	9.42	...	0.08	...

a. Run by electrolysis in HNO_3-HF solution.
b. 5.0-gram sample in HNO_3-HF electrolysis.
c. Iodometrically.
d. $Fe(OH)_3$ redissolved with HCl—dichromate titration.
e. Gravimetrically as nickel dimethylglyoxime.
f. Mercury cathode separation.
g. H_2SO_4 dehydration—corrected for Pb.
h. Separate sample run colorimetrically.
i. Precipitation of Zn as ZnS, ignition to ZnO.

the tin (iron, lead, nickel, antimonial lead, aluminum or other agent) and 65 ml concentrated CP HCl.

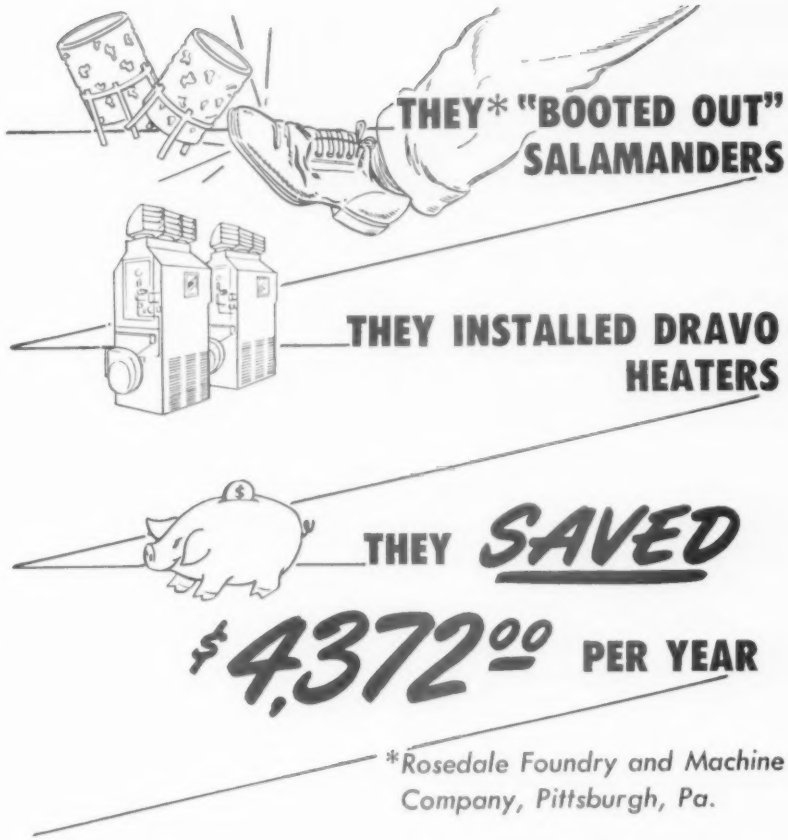
Put a one-hole rubber stopper containing a bent glass tube into the mouth of the flask and place the other end of the tube into a small flask (150 ml) of a saturated solution of sodium bicarbonate. Transfer the entire assembly to the hot plate. Allow the solution to boil gently 5 minutes and remove the assembly to the sink for cooling to approximately 10°C. Remove the stopper and tube from the flask, add a few marble chips and 1 ml starch solution as indicator and titrate immediately with iodine-potassium iodide solution (1.27 grams CP iodine dissolved in distilled water containing 2.0 grams of potassium iodide and made up to 1 liter with distilled water) to a deep blue end-point. The strength of the I_2-KI solution is such that 1 ml equals about 0.05 per cent tin. The solution should be standardized against CP tin dissolved in sulphuric acid and then treated as above.

Avoid Dry Solution

To the filtrate from the stannic oxide filtration is added 15 ml CP perchloric acid (72 per cent) and take the solution to strong white fumes (hood). Do not allow the solution to become dry or bake. Remove from the hot plate, add 50 ml distilled water and heat until all but the silica is in solution. Filter through a No. 41 Whatman or similar filter paper and wash 5 times with hot distilled water (if all perchloric acid is not washed out of the filter paper sputtering will result upon ignition of the residue). Transfer the filter paper to a small platinum crucible and ignite, first at a low temperature until the paper is burnt and then at about 1000°C for 15 minutes. Cool in a dessicator and weigh. The factor for silicon is 0.4672.

If desired, the crucible and contents may then be treated with a few drops of concentrated CP H_2SO_4 and 3 ml of CP hydrofluoric acid (48 per cent) and the H_2SO_4 carefully evaporated. The ignition then is repeated and the crucible weighed. The difference between the first and second weights represents silica. However, during many runs the difference was always found to be negligible.

Filtrate from the silica filtration is transferred to a 250 ml volumetric flask and carefully diluted to the mark. It is then thoroughly mixed and an aliquot of 20 ml pipetted (use a Pipettor or similar mechanical aid) into a 100 ml beaker. One gram of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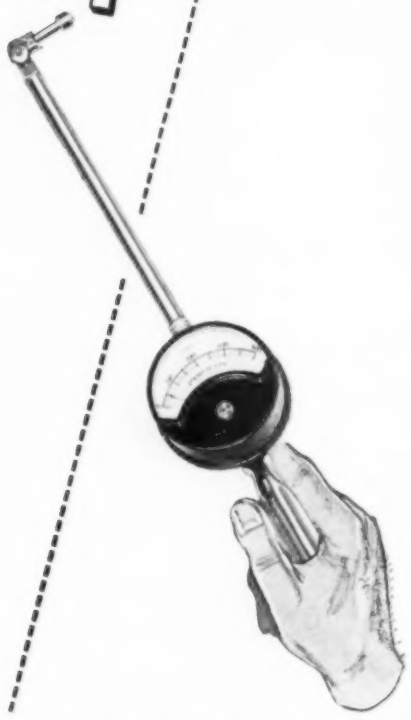

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CP granulated zinc is added and the solution boiled for 5 minutes. The displaced copper and remaining zinc is filtered through a No. 42 Whatman filter paper and the residue washed twice with hot distilled water. Discard the paper and residue and dilute the filtrate to 100 ml (volumetric flask). After thorough mixing, pipette 50 ml of the solution into a 250 ml volumetric flask and add 1 ml CP concentrated hydrochloric acid, followed by 25 ml 10 per cent solution of potassium thiocyanate. Add 1 ml 3 per cent hydrogen peroxide solution and dilute with distilled water to the mark.

Mix thoroughly and after 20 minutes read in the colorimeter at 525 mu. Scale readings are referred to an iron curve prepared by taking certain given amounts of CP iron through the procedure described above. A 250 ml solution gives an iron range of 0.00-0.60 per cent. For higher iron contents 25 ml of the solution is filtered into a 1-liter volumetric flask and treated as above, giving an iron range up to 4.80 per cent. Colorimeter readings are referred to a curve prepared by taking various amounts of CP iron through the same procedure, including dilution to 1 liter.

Determination of Nickel

The nickel is determined by filtering 50 ml of the copper-free solution into a 250-ml volumetric flask (for nickel up to 1.0 per cent) or 25 ml into a 1-liter volumetric flask (for nickel up to 8.0 per cent) and adding, with swirling after each addition, 10 ml 10 per cent citric acid solution, 2 ml iodine solution (25.0 grams KI dissolved in 50 ml H_2O, 13.0 grams I_2 added, and the solution diluted with distilled water to 1 liter), and 10 ml of CP NH_4OH (1:1). Then add 10 ml of 3 per cent aqueous solution of sodium dimethylglyoximate and shake well. Dilute to the mark and after 20 minutes, read in the colorimeter at 525 mu. Readings are referred to curves made up by carrying various quantities of CP nickel through the same procedure.

Another aliquot of the original 25-ml solution from the silica filtration is used for the determination of manganese. A 25-ml aliquot is pipetted into a 150-ml beaker. Ten ml CP nitric acid (1:1) are added, followed by 15 ml of 0.33 per cent silver nitrate solution and 50 ml distilled water and the solution heated on a hot plate to approximately 60° C. Several grams of CP ammonium persulfate are added and the beaker allowed to remain on the hot plate until there is full development of

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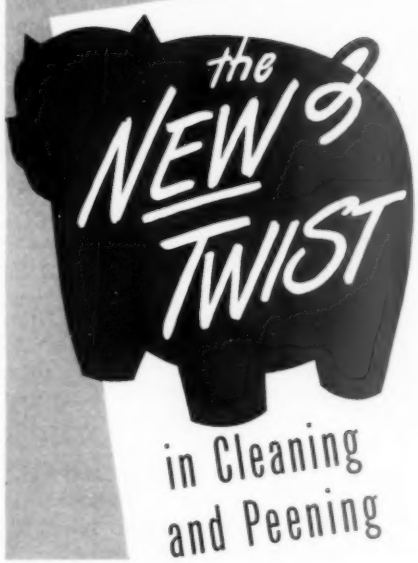

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the purple permanganic acid color. The solution is transferred to 250 ml volumetric flask, diluted to the mark and thoroughly mixed. After cooling to room temperature a portion of the solution is used for the colorimeter reading at 525 mu and the reading referred to a curve made up by carrying known amounts of CP manganese through the same procedure. The manganese found is multiplied by 10 to secure the percentage of manganese present in the alloy.

Determining Copper and Lead

For copper and lead proceed as follows: Transfer 125 ml of the solution from the silica filtration to a 150-ml beaker. Add 10 ml CP nitric acid (1:1) and place in position for electrolysis. Dilute with distilled water to cover electrodes (if necessary) and cover the beaker with a split watch glass. Electrolyze for 10 minutes at 5 amp, with stirring, add 0.5 ml CP H_2SO_4 (1:1), 1.0 ml 10 per cent sulfamic acid solution and 2 drops of 1 per cent CP HCl. Electrolyze for 20 minutes and turn off stirrer. Wash down the split watch glass with distilled water, lower the amperage to 4 amp and remove the electrodes. Dip them immediately into distilled water, then alcohol, shake off most of the alcohol and dry in the oven. The copper should be dried at 110°C., and the lead dioxide at 210°C for at least 15 minutes. After weighing the dried electrodes (cooled to room temperature) multiply the result by 2 for the copper content of the alloy and factor the lead dioxide result by 0.8634 x 2 for the lead content. However, the lead dioxide may be contaminated with a little manganese dioxide. To correct for manganese treat the weighed anode with 10 ml CP HNO_3 (1:1) to dissolve the plate and determine the manganese as in the preceding paragraph. Calculate the Mn to MnO_2 and deduct the latter from the PbO_2 plus MnO_2 weighing. Factor the reminder by 0.8634 and multiply by 2.

To the solution after electrolysis is added 10 drops of bromocresol purple (0.04 per cent aqueous solution) and 5.0 grams ammonium acetate. When the latter has dissolved, CP NH_4OH (1:1) is carefully added until the bromocresol purple indicator just turns from yellow to purple. After 5 minutes filter the aluminum and iron hydroxides through a No. 41 Whatman or similar open filter paper and wash the residue with hot 1 per cent ammonium acetate solution. Place the paper and residue in a porcelain crucible and ignite strong-

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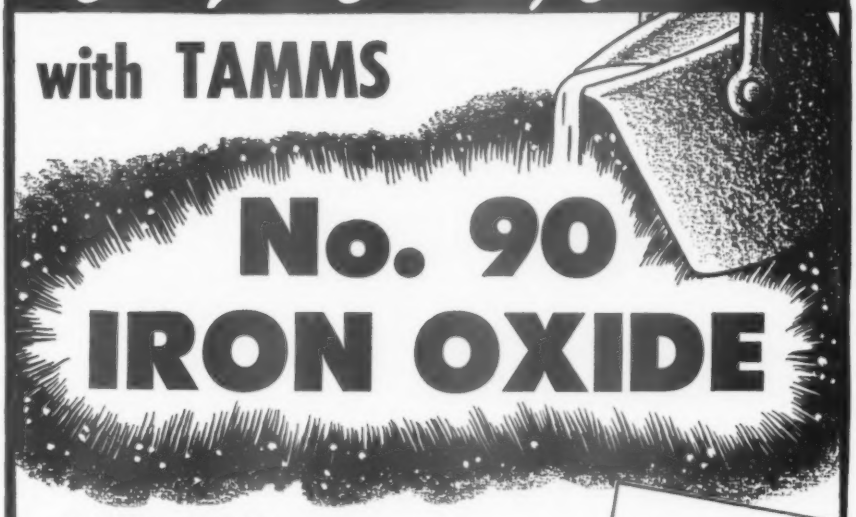

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ly for 30 minutes. Cool in a desiccator and weigh. Deduct from the weight of the residue the known amount of iron calculated to Fe_2O_3 and multiply the remainder by 2. Factor the result by 0.5291 for the Al content of the alloy.

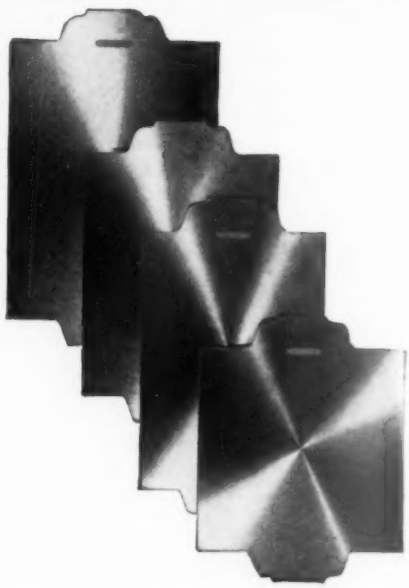
Zinc is taken by difference, the latter procedure having been shown by many tests to be as accurate as a separate zinc determination. In those tests zinc by difference was compared to zinc determined by the classical H_2S separation in sulphuric acid solution and ignition of ZnS to ZnO.

Results for typical alloys run by the procedure described here are shown in Table II. Since certified standard alloys were not available, samples run in duplicate by conventional methods were used to check the single sample procedure.

Discussion—The ammonium acetate added to the solution prior to NH_4OH precipitation of iron and aluminum is used to prevent zinc hydroxide adsorption on the precipitate and to avoid precipitation of manganese hydroxide. Of the approximately 100 samples run 3 were found, nevertheless, to contain small amounts of Mn in the hydroxide precipitate. Resolution of the precipitate with acid and re-precipitation with ammonia prevented Mn precipitation in all three instances. Where greater accuracy than is generally needful in control work is desirable, it is therefore recommended to re-precipitate the Al and Fe. The bromocresol purple indicator must be used because some of the aluminum precipitate re-dissolves with the addition of too much ammonium hydroxide. Aluminum precipitation is complete between pH 7.0-7.5 and the color change of the bromocresol purple (yellow to purple) is over the pH range of 5.2-6.8.

Although it has become quite common to use perchloric acid (60-70 per cent) in analytical laboratories, the potential hazard of this reagent when in contact with organic material should be kept in mind. If many perchloric fumings are done the fuming hood should be rinsed down with water at least once a week. Hot, concentrated solutions of the reagent should be kept away from rubber tubing, etc.

It was found that extra precautions must be taken in cleaning platinum electrodes used for copper and lead electrodeposition. The method adopted is to wash the electrodes twice with carbon tetrachloride, dry, then heat to cherry redness. After cooling, the washing and heating is repeated, and the cool electrodes carefully weighed to the nearest



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tenth of a milligram. The amount of nitric acid added to the perchloric-nitric acid solution for electrolysis, while more than the amount theoretically necessary, gave the best copper plate—in agreement with the findings of Norwitz, Greenberg and Bachtiger[4]. Stirring the solution during electrodeposition is not considered, by most authorities, to contribute to accuracy but it is generally used in industrial laboratories because of the great saving in time effected.

More than 0.25 per cent iron prevents the quantitative precipitation of tin as stannic oxide[5], consequently if more than that amount of iron is present the solution must be boiled sufficiently to reduce the acidity[6].

A trace of iron is contributed to the solution by the reagents used. For very accurate results the iron found should be corrected by running a blank of reagents treated in exactly the same way as the sample.

The use of sodium dimethylglyoximate, rather than dimethylglyoxime, for the nickel determination is justified, it is felt, because it is readily soluble in water whereas the latter reagent must be made up in 1 per cent alcoholic solution. If the sodium solution is prepared fresh each week there is little more deterioration in nickel combining power than with alcoholic dimethylglyoxime.

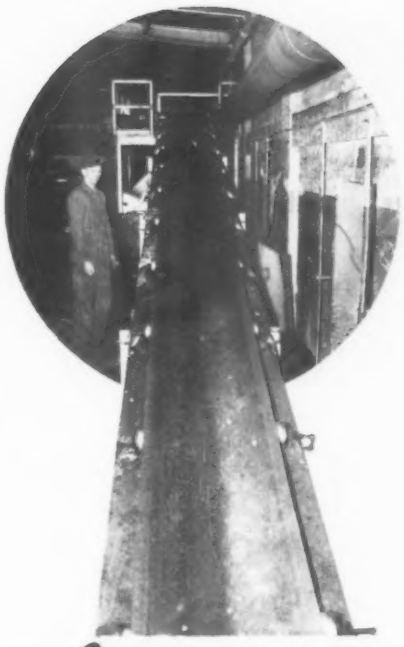
Bacteria Spoils the Solution

The citric acid solution used in the iron determination is an ideal medium for the growth of micro-organisms, etc., consequently when a cloudiness or growth is observed in the solution it should be discarded.

There have been many suggestions as to the preparation of the starch solution used as indicator in the tin titration; suggestions designed to minimize decomposition due to warmth and bacterial growth. The following method was found to yield a solution stable for several months: Bring 800 ml distilled water in a 1-liter beaker to a boil and add 3.0 grams "soluble starch." Boil 5 minutes. Cool to room temperature and add 6.0 grams caustic soda (NaOH) dissolved in a little distilled water. Let stand 1 hour and make just neutral with CP HCl (1.9). Add 1 ml glacial acetic acid and dilute to 1 liter with distilled water.

A Fisher Electrophotometer, A. C. Model (filters) was used in the experiments described in this paper for all colorimetric analyses and a Fisher Electroanalyzer for all electrodepositions of copper and lead.

Acknowledgement — The author wishes to acknowledge the valuable



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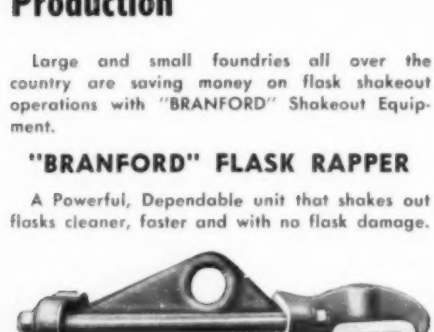

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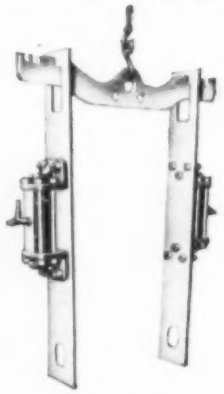

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assistance of Miss Mary Mallory and Mrs. D. Crofoot in making many of the analyses done during the course of this study.

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Steel Foundry Core and Molding Sands

(*Continued from page* 113)

is a good deal less than the price of new sand. The savings thus secured are in direct proportion to the distance between the foundry and its source of sand supply, so that in many if not most cases the installation of a reclaiming unit is an attractive investment.

Cement Bonded Sand—Over fifty years ago, John Smith, Verona, Pa., working in co-operation with the late Dr. Richard Moldenke, developed and patented[21] a mixture of sand and portland cement as a material for cores "for use in making castings of iron, brass and other metals." The mixture described in the Smith patent consisted of approximately ten parts of sharp sand, one part of cement and preferably "a sticky fluid, such as molasses water." In *The Production of Malleable Castings* and *The Principles of Iron Founding*, Dr. Moldenke[22] refers to this development. In the latter he says "cores made with nine parts sharp sand and one part cement, and just enough water to dampen the material and allow the cement to set, were highly satisfactory and were practically cement blocks of great porosity." Handling the mixture, however, was found to injure the hands of the coremakers, and its use was discontinued. Dr. Moldenke suggested, however, that it would be perfectly satisfactory for use in coremaking machines.

Moldenke and Smith worked largely if not entirely on cores for gray iron pipe fittings. At various times since Smith's patent was issued, cores for pipe fittings and other small iron castings have been made on a production scale, and in at least one case, Moldenke's suggestion was followed, and core blowers were installed and successfully operated on cement-bonded sands. As a material for molds, and even for cores, however, cement-bonded sands were used

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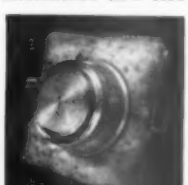

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to only a limited extent until a number of years later, when Jean Baptiste Durand of Marseilles, France, demonstrated that not only small cores, but molds in which castings of all sizes are poured, can be successfully made from cement-sand mixtures.

Durand took out patents[23] covering the use of sand bonded only with cement and water, in France, the United States and other countries. In applying for these patents he emphasized the importance of sharply limiting the maximum amount of moisture in the mixture and his American patents were allowed largely on the ground that Smith had not recognized the importance of this, and had not used the proportions of water found necessary by Durand—a claim that was not upheld by our courts.

During the past 15 years cement-bonded sands have been adopted in a number of American foundries, and have proved especially advantageous in making heavy brass and bronze castings, and only slightly less so for gray iron work. In steel foundries the process has been found best suited to the production of heavy castings, such as are generally made in dry sand molds. For this work, cement-bonded sand has the definite advantage that it does not need to be dried in ovens or with hot air heaters, but is simply allowed to stand in the air until the water and cement have combined, making the mixture hard and firm. The setting of cement is due to the union of water with the anhydrous silicates and aluminates of lime of which it is composed, so that if a cement-sand mold or core is artificially heated and the water driven off before the cement has had time to unite with it, the mixture will remain weak, crumbly and quite useless.

Avoid Use of Heat

It is desirable, therefore, that no heat be applied to the sand until hydration is nearly complete, and in practice the molds and cores are not heated at all, but merely allowed to stand in air for 72 hours before closing and pouring. For that reason, molds and cores made of cement-bonded sand are not distorted by handling or by expansion and contraction due to heating and cooling, and therefore remain much truer to pattern than do most dry sand molds.

No ovens or dryers being required for cement-sand molding, the cost of fuel and the maintenance expense for ovens is saved, and the space occupied by ovens in dry sand work can be used for other purposes. Another advantage of the process is that when set, the sand-cement mixture has so much strength that it does not require

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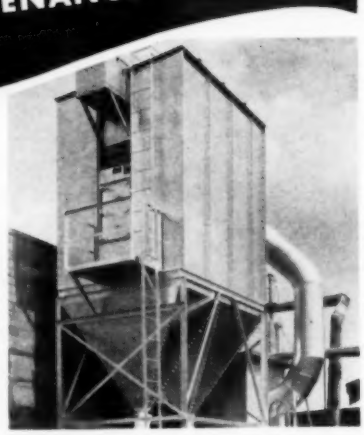

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the support of heavy flasks, and large blocks of it can be handled like so many pieces of reinforced concrete. In fact, the dry strength of the material is so great that it is very hard to knock it out of the flasks after the castings have cooled, and for that reason flasks are used as little as possible. In many cases this results in a considerable saving, since elaborate flask equipment and the usual large flask gang are not needed. The admitted advantages of the method are to some extent offset by certain disadvantages which will be better understood when the technique of cement-sand molding is explained.

In steel foundry practice it has been found necessary to use all new sand in cement-sand facings, mixtures in which old sand is incorporated having proved unsatisfactory. The sand used should be free from clay and of uniform grain size, an AFS grain fineness number of 45 to 55 being preferred. In Table VI are shown the screen analyses (unfortunately made with an out-of-date set of sieves) of two sands that have been found satisfactory when bonded with cement.

TABLE VI—SCREEN ANALYSES

U.S. Series Equiv. No.	—Per Cent Retained— Sand A	Sand B
6	0	0
12	0	0
20	0.45	0.95
40	23.45	21.85
70	53.65	64.80
100	15.65	9.25
150	5.75	2.30
200	0.77	0.30
270	0.10	0.15
Pan	0.10	0.15
	99.92	99.70

The facing mixture should consist of 100 lb sand, 13 lb high-strength cement and enough water to bring the moisture content to about 6 per cent. A typical batch contains 1250 lb sand, 162 lb cement, and 91 lb (10.9 gal) water. Muller type mixers have been found most satisfactory for mixing sand and cement. In machines of the paddle wheel type some of the mixture sticks to the sides of the mill, hardens, and jams the blades. Even with mullers this accumulation of partially set cement and sand gives trouble, and it is necessary to take particular pains to clean out the sides of the pan at regular intervals. A certain amount of leeway in the moisture content is permissible, especially in hot, dry weather when the moisture evaporates more rapidly, and more water should be used. This is advisable also if the sand is to be carried on belt conveyors to the place where it is to be used. In no case should the moisture content be allowed to exceed 8 per cent.

The old molds are broken into lumps and put through a hammer mill

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to obtain material for backing. Some of the cement is not completely hydrated, and will set to a certain extent when mixed with water, so that less cement is required in the backing than in the facing. A satisfactory backing mixture contains 100 lb old sand, 10 lb cement, and water to bring the moisture content to 7 per cent. A typical batch consists of 1250 lb sand, 125 lb cement and 106½ lb (about 12¾ gal) water. As has been described in the section on molding methods, a great many broken lumps of old molds, running from about the size of a walnut to that of a paving block, are incorporated in the backing. Enough mixed sand is used to hold the mass firmly together.

Practice Is General

This practice is almost always followed when a pattern is to be bedded in, or the sand is to be swept to shape. Fig. 58 (THE FOUNDRY) March, 1949, page 93) shows a partially swept-up drag for a cinder pot, in which a great many chunks of old molds are thus used. As noted in that issue cement-bonded sand is particularly well suited to bedded-in and swept-up jobs, since the hardness of the tucked-in sand is due, not to tight ramming, but to the hydration of the cement.

The necessity of using all new sand for the facing of steel foundry molds is one of the weak points of the process, since the consumption of new sand per ton of castings produced is quite high. The cement adheres so firmly to the sand grains that it cannot be removed by mechanical scouring and washing. Leaching with weak acid solutions will separate the cement from the sand grains and give a product that can be used in place of new sand for facing, but the cost is so high that in most localities acid leaching would not pay.

It is possible that heating the old sand to dehydrate the cement and break its grip on the sand grains, followed by washing or air separation, would be satisfactory, but so far as the author is aware, experiments along this line have not yet been carried out, and in steel foundries where the process is used, the facings are still made from new sand and cement.

Permeability of cement-bonded sand is quite high, especially if the moisture content of the mixture is kept within proper limits. When the mold is allowed to set for 72 hours, the permeability increases slightly, as will be noted in Table VII, which shows the variations in permeability of standard AFS 2-in. diam x 2-in. high test pieces, with different moisture

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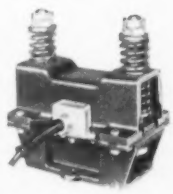

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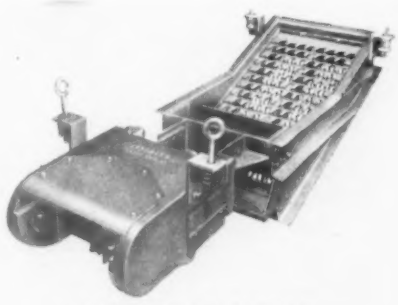

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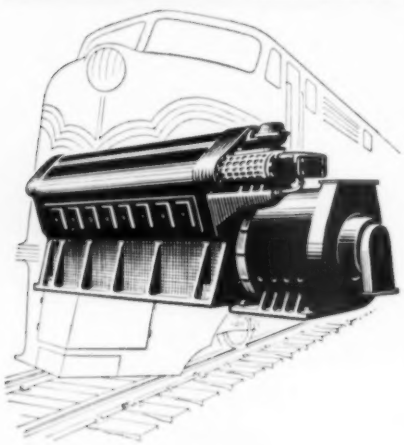

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percentages, in both the green and the air dried conditions.

As the cement hydrates, it combines chemically with a large part of the moisture in the sand, which therefore is not found by the regular AFS method for determining moisture. A certain amount of the moisture is lost by evaporation into the air, and from 1 to 2 per cent or even more remains as uncombined water, absorbed on the surfaces of the sand grains. When the sand is dried at 221 to 230° F, this uncombined moisture is driven off, and therefore is shown in the standard AFS determination of moisture. As the cement hydrates, the strength of the sand increases rapidly, and exceeds the maximum determinable with the usual type of apparatus.

TABLE VII—PERMEABILITY

Original % Moisture	Green	Set 72 Hr
6	110	90–130
7	85	70–90
8	70	80–92

The decrease of free moisture content and the accompanying increase of strength are shown in Table VIII. The data in this tabulation were obtained from tests of standard 2-in. diam x 2-in. high AFS specimens. After setting for 72 hours, the sand in the interior of large cores will contain much more free moisture than the 2-in. diam specimens on which Table VIII is based; in some cases as much as 3 per cent being present.

TABLE VIII—EFFECT OF SETTING TIME

Setting Time, Hr	Moisture %	Compressive Strength	Compression Shear	Tensile Strength
0	6.2	1.3	0.6	*
2	4.5	4.8	1.5	*
4	4.1	14.2	3.9	*
6	2.1	41.0	11.2	12
8	1.0	89.0	29.0	16
24	1.0	**	**	32
48	1.0	**	**	34
72	1.0	**	**	38

* Too weak to put in machine
** Strength above capacity of machine

Hot strength of cement-bonded sand is practically zero. After less than a minute's exposure to a temperature of 2500° F, the dial of the dilatometer gives a zero reading when pressure is applied to the test piece, which squashes down like so much chewing gum. It is largely for this reason that castings with sections heavy enough to heat the mold to a depth of ¼ or ½-inch, do not crack or tear when made in cement-sand molds, despite the very high compressive strength of the sand when cold.

This freedom from tears has been noted by many observers. On the other hand, if the casting is of light

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section and so shaped that the mold resists the contraction of the metal as it cools, numerous cracks or tears will be formed when the piece is cast in cement-bonded sand, unless very elaborate means are taken to hollow out the portions of the mold that resist the contraction. For that reason, the process is not well suited to the production of castings such as freight car side frames and bolsters.

The free and the combined water, both of which are driven off when cement-bonded sand is heated to the temperature of liquid steel, total some 3 to 4 per cent. This is converted to steam, some of which dissociates on contact with the hot steel to form hydrogen and oxygen. The steam and gas are readily vented off in large internal cores, since the high permeability of the sand permits them to flow readily into good-sized passages provided for the purpose. Venting off the steam and gas is made easier by the fact that much of it is evolved only after the sand has reached a high temperature.

Small Cores Present Problem

Smaller internal cores which heat up very rapidly, however, are a different matter, and it is often almost impossible to vent the gas out of them. Such cores, therefore, are usually made of oil sand, or in some cases pitch sand. Another excellent reason for not using cement-bonded sand in small internal cores is that when it has cooled off, the sand is so hard that it is almost impossible to get it out of the castings on the rough cleaning floor.

As may be inferred from Table VIII, the cement begins to set soon after being mixed with the sand and water, and hydration proceeds so rapidly that the sand becomes unfit for use in a little over 3 hours. It cannot, therefore, be kept over, like green or dry sand mixtures, but must be used soon after it is mixed. When the shop is working round the clock, each shift may take over the sand from the preceding one. When molding is on a one or two shift basis, however, the foremen must keep close track of the requirements of the various floors, and see to it that only enough sand is mixed to complete the jobs laid out.

(To be concluded next month)

References

21. U. S. Patent No. 575,074 "Molders' Core," granted Jan. 12, 1897 to John Smith, Verona, Pa.

22. Richard Moldenke. *Production of Malleable Castings*, 1910, page 39, and *Principles of Iron Founding*, 1917, page 316.

23. U. S. Patent No. 1,918,089 "Manufacture of Foundry Molds," granted July 11, 1933; U. S. Patent No. 1,918,090 "Composition for Foundry Molds," granted July 11, 1933, and U. S. Patent No. 1,924,028 "Manufacture of Foundry Molds," granted Aug. 22, 1933.

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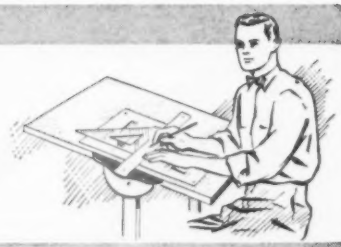

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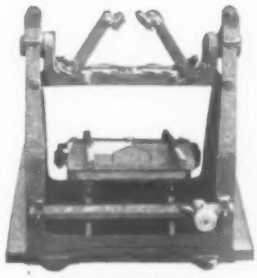

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With the EDITORS

INDUSTRIAL CASUALTIES: Several weeks before we became involved in the present war emergency, Jim Wolfe, secretary-treasurer of the Non-Ferrous Founders Society, carried the following paragraph in the monthly publication of the organization:

"You may have noticed the frequency of obituary notices in *The Crucible*. Part of them may be due to passing years, yet the age factor denotes to us an aftermath of World War II. Long hours, no help, no metal and frustrating arguments in Washington. This industry had its casualties just as men in combat did."

You are quite right, Jim. And now many of the men who carried the burdens of castings production from 1941 to 1946 again are facing the problems of emergency demands while many factors, particularly manpower, are in worse shape than before. These men are ten years older, and during that period have lost something in resilience and physical endurance. Unless some of the worries of operating plants under emergency conditions can be passed along to younger executives, the toll among leadership in the foundry industry will be heavier.

—o—

Travel: In a couple of weeks, the editors will pack their bags, gather in transportation, and take off on the regular fall hunt for news. We will visit many foundries, attend conventions, and check with producers of equipment and supplies to report developments at this important time when foundries are edging more and more toward emergency production.

Looking backward a little, the vacation period did not eliminate meetings, and so the editors were busy. Late in June, Bill Gude attended the annual meeting of the Malleable Founders' Society at Hot Springs, Va. and then went out to Chicago for the annual Chapter Officers Conference of the AFS. Just before taking off on his vacation, he presided as retiring president at the annual outing of the Northeastern Ohio Chapter of the AFS. Vincent Delport attended the annual conference of the Institute of British Foundrymen at Buxton, England. The editor attended four meetings of Munitions Board advisory subcommittees and a conference of the Society of Business Magazine Editors in Washington, the annual meeting of the American Society for Testing Materials in Atlantic City and the opening of the new foundry at the research center of the International Harvester Co. in Chicago.

—o—

Award: Congratulations to FOUNDRY advertiser, Frank G. Hough Co., and its agency, Ervin R. Abramson Advertising, for winning the Putman award for "the best use of industrial advertising and the best documentation for such use." Award was made at the recent convention of the National Industrial Advertisers Association in Los Angeles. Reading from left to right: Russell L. Putman, president, Putman Publishing Co.; Raymond P. Wiggers, advertising manager, Frank G. Hough Co., and Ervin R. Abramson, president of the advertising agency.

—o—

Watch the Birdie: In preparing the interesting "Man-to-Man" article on the Lee Hobby Foundry for this issue, our favorite columnist, Ralph L. (Doc) Lee secured the able assistance of that well known foundryman, John E. Linabury of General Motors Corp. to take the photographs. In looking over the manuscript, we thought it an excellent time to include a photograph of Mrs. Lee, the vice president in charge, along with the author. The officers of this now famous foundry agreed to the project, but reported that since John was enjoying a trip to Europe, other arrangements for professional service would have to be made. When we received the photograph reproduced on page 130, we also had a note from the author confessing that he did the job all by himself with a string attached to the camera shutter. Yes Ralph, it "turned out pretty good," especially of the vice president. You look a bit preoccupied with the trick.

—F. G. S.

Modern Use of Exhaust Ventilation Equipment

(*Continued from page* 112)

blast barrels, one special automatic blast cabinet and one 66-in. diameter swing table. Arrangement of the 21 tumbling mills in the cleaning area is indicated in Fig. 7.

Clean castings are finished on chipping tables and stand grinders. Hood design for chipping and portable grinding is unique and extremely effective as developed by Harvester's engineers. The 21 benches are provided with back shields, individual lighting, and a down draft and lateral exhaust of 2200 cfm for each station.

Dust Collection Equipment — Removal of entrained dust from all of these operations is obtained from twenty Type N collectors located as centrally as possible. Overhead location was selected to save floor space and bring elevation of sludge disposal point high enough to allow gravity flow through the sluice ways.

Collector shapes were modified to fit in roof truss area, with exhausters mounted separately as illustrated in Fig. 13. Two methods of sludge disposal from the collectors were evaluated by the company engineers. The more usual method of ejecting collected dust, storing it in small tote boxes at each collector location and removing these containers to a central disposal point by fork truck did have the decided advantage of lower equipment cost. In spite of the increased cost of a central sluicing system, such arrangement was selected as it eliminated manual handling from a number of dust collector pick-up points to disposal area, assured cleaner floor conditions by eliminating spillage or overrunning of sludge containers, and offered a means for transport of other foundry refuse, such as quenched slag and core sand refuse, without manual handling.

Sluicing Systems — Two sluicing systems are employed for conveying refuse to the disposal area. The sand system picking up refuse from eight Type N collectors plus the core sand refuse has a total run of 630 ft. The slag system picking up the refuse from 12 Type N collectors plus the quenched cupola slag has a sluice length of 950 ft before emptying water into settling tanks. Waste disposal facilities for water at this company's plant made it imperative that no dirty water be discharged from the recirculating systems. Four settling tanks, two for the sand system and two for the slag system, are provided as indicated in Fig. 11. Capacity of each sand tank is 8750 cu ft and each

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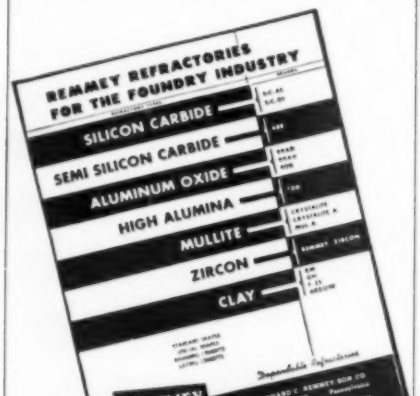

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Cleaned water from the settling tank in service is picked up by a slurry pump. Three of these pumps are installed in the pump room shown in Fig. 17. Each pump has a capacity of 1500 gpm against a 115-ft head. The third pump is for standby purposes, and manifolding is so arranged to permit operation of the system by any two of the three pumps. Of the 1500-gallon capacity in each system, from 25 to 75 gpm is introduced to each of the Type N dust collectors. This capacity, except for the volume lost by evaporation, is discharged through the overflow weirs in the water level control boxes extending the full length of each collector side, as illustrated in Fig. 18.

Introduction of this water to the dust collectors floats all but the heaviest particles out of the collector tanks into the sluicing systems. Sludge ejection equipment shown in Fig. 19 is included to remove any settled material and to provide for dust collector operations at any time water supply to the sluicing system should fail.

Sluice Construction Described

Connection to the head end of one sluice is indicated in Fig. 20, and typical sluice construction is shown in Fig. 18. Size of sluice and pitch were designed to maintain water velocities of not less than 4 fps—velocities that have proved ample to convey all refuse handled by this system without settling out or causing obstructions and buildup. Sides of the main sluices were extended 24 in. above the water level to eliminate splashing and to give holding capacity should obstruction occur at any point in the system. Deflector plates were required on many of the turns to stop climbing action of the water due to centrifugal force encountered from the water flow.

Extreme care to prevent water spillage to the floor below was exercised throughout the project. Water-tight walkways and collector platforms were provided under all dust collecting equipment and open sluice runways. Where either equipment was located over hot metal areas, splash plates were added to the walkway and platform handrails as an additional safeguard. Closed pipes were used in every case where water had to be conveyed over the hot metal and pouring area.

Drainage provisions for equipment platforms and walkways were designed to handle the maximum water volume that could be discharged in those areas due to any obstruction that could occur in the water disposal circuit during its regular operation.

Detail of feed points for core sand refuse can be noted from Fig. 5 and slag quenching through feeding to slag sluice from Fig. 14. At the far end of each of the slag quenching troughs 125 gpm of recirculated water from the slag settling tank is introduced. Operation of the settling tanks can be visualized from Fig. 11. Slag sluice and sand sluice terminate on the center wall between each of two pairs of settling tanks. Outlet is provided with a swivel discharge spout operated by remotely located winches. Each tank is maintained in service for 48 working hours during which time refuse settles out in the tank before cleaned water flows under skimmer plates to eliminate floating debris, then into the recirculating pump well. Effective settling is obtained as recirculating water has never contained more than 1 per cent solids since the system was placed in operation.

At the end of the 48-hour working period, water is discharged to the cleaned adjacent tank. Much of the water from the original tank is transferred to the second settling tank through this operation. Two slurry pumps with a capacity of 400 gpm complete the water transfer to the second tank by removing the excessive water from the settling sludge through a dewatering louvre placed below the overflow weir governing the minimum water level for the recirculating pumps.

All waste sand is sluiced to the two outside dewatering tanks, and other dry foundry refuse, such as floor sweepings, broken cores, etc., is dumped from fork trucks into these tanks. Dewatered material is picked up by grab buckets and emptied into trucks for delivery to the disposal area. Makeup water to replace water evaporated in dust collector units and slag quenching operations, and water included with the disposed material, is obtained from waste cooling water from air compressors and cupola blast gates.

Over a 60-day test period, inspection, cleaning and maintenance involved has averaged not more than 12 man-hours per 8-hour shift on dust collectors, sluicing systems, settling and dewatering tanks.

Acknowledgements — International Harvester's industrial engineering and construction department; their consulting engineers, National Engineering Co.; American Air Filter Co. and the erector, R. C. Mahon Co. pooled their individual experiences and knowledge to make the Louisville plant a truly clean place for the foundry personnel.

...TRADE PUBLICATIONS...

For More Details on these Items Use Reply Card—Page 225

AIRLESS BLASTING: American Wheelabrator & Equipment Corp., 505 South Byrkit St., Mishawaka, Ind.—Illustrated booklet deals with airless blasting and describes the types of machines available. It discusses application of the airless blasting process to various metal cleaning, finishing, and shot peening problems.
For More Details Circle No. 90—Page 225

IDENTIFYING METALS: International Acetylene Association, 30 East 42nd St., New York 17—Chart entitled "Simple Tests for Identifying Metals—To Aid in the Determination of Correct Oxy-Acetylene Welding Procedure" explains in tabular form, methods of identifying 13 metals and alloys by appearance, spark test, chip test, and blowpipe test.
For More Details Circle No. 91—Page 225

REFRACTORY: United States Graphite Co., 1621 Holland St., Saginaw, Mich.—Bulletin G8 deals with a graphite refractory designed for admixture with common refractory materials for ladles, spouts, runners, and cupola linings. Formulation, mixing, and applications instructions are outlined.
For More Details Circle No. 92—Page 225

LIGHTING SPECIFICATIONS: RLM Standards Institute, 326 West Madison St., Chicago 6—"RLM Standard Specifications for Industrial Lighting Units" contains detailed specifications for 18 different fluorescent and incandescent industrial lighting units which carry the RLM label.
For More Details Circle No. 93—Page 225

GENERAL INFORMATION: Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.—Revised issue of "Useful Information for Foundrymen" is a 42-page pocket-sized booklet containing facts, figures, formulas, brick counts, fuel costs, and other useful information.
For More Details Circle No. 94—Page 225

CASTING IMPREGNATION: Western Sealant Inc., 9042-48 Culver Blvd., Culver City, Calif.—Illustrated brochure contains descriptive and technical data on a process for impregnating metal castings and for bonding similar and dissimilar materials to each other.
For More Details Circle No. 95—Page 225

SAND ADDITIVE: Masonite Corp., 111 West Washington, Chicago—Bulletin describes a powdered form of hemicellulose extract sand additive designed to improve sand flowability and shakeout and to produce cleaner castings. Sand formulations developed for steel and malleable iron foundries are included. Initial tests have shown the material useful as a component in noncereal bonded sands for green mold facings in gray iron and nonferrous work.
For More Details Circle No. 96—Page 225

ALUMINUM ALLOY: William F. Jobbins Inc., P. O. Box 230, Aurora, Ill.—Booklet describes an aluminum casting alloy available in grades for sand, permanent mold, and die casting. Composition, physical properties, and test data are listed. Applications are discussed.
For More Details Circle No. 97—Page 225

TRUCKS: Hyster Co., 2902 N. E. Clackamas St., Portland 8, Oreg.—Catalog pictures and describes five models of turret trucks, formerly manufactured by Salsbury Corp., Los Angeles. They include platform, pallet and cargo trucks, tugs, and automobile and freight car loaders.
For More Details circle No. 98—Page 225

TEMPERATURE INDICATORS: Tempil Corp., 132 West 22nd St., New York 11—Catalog 501 describes and gives directions for use of temperature-indicating products including crayons, pellets, and paste. Also offered is Vol. 5, No. 3, *Tempil Topics*, dealing with "Induction Heating."
For More Details Circle No. 99—Page 225

ABRASIVE DISKS: Metal Removal Co., 1014 North Ashland Ave., Chicago 22—Descriptive folder contains samples and a graphic description of adhesive-backed abrasive disks and flexible disk holders. Disks are held on the holders by the adhesive back.
For More Details Circle No. 100—Page 225

INDUSTRIAL LUBRICATION: Stewart-Warner Corp., Alemite Division, 1826 Diversey Parkway, Chicago 14—Booklet on lubrication presents examples of production or machinery expense economies attained through modern handling and application of greases and oils.
For More Details Circle No. 101—Page 225

FLOOR PATCHING: Master Builders Co., 7016 Euclid Ave., Cleveland 3—Bulletin describes an iron asphalt patching material for patching or resurfacing worn concrete floors. Mixing directions are given and the method of application described and illustrated.
For More Details Circle No. 102—Page 225

DUST SUPPRESSION: Whiting Corp., 15607 Lathrop Ave., Harvey, Ill.—Two bulletins deal with wet dust suppression: FY-166 describes the function and gives the dimensions for manual and automatic sludge settling tanks; FY-167 shows a variety of in-

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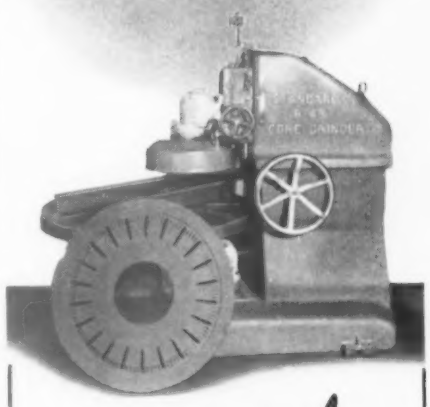

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stallations of wet dust suppression systems operating under typical conditions.
For More Details Circle No. 103—Page 225

THERMOMETERS: Bristol Co., Waterbury 20, Conn. — Bulletin T-840 provides information on the company's line of liquid-filled, vapor pressure, and gas-filled thermometers in models for recording, indicating, controlling, and telemetering temperatures.
For More Details Circle No. 104—Page 225

CORE DRYER: Allis-Chalmers Mfg. Co., 1032A South 70th St., Milwaukee—Bulletin 15B7306A describes a core dryer consisting of an oven and a dielectric heater and points out that few changes in present techniques and auxiliary equipment are required with dielectric core drying.
For More Details Circle No. 105—Page 225

GAS BURNERS: Selas Corp. of America, Erie Ave. & D St., Philadelphia 34—Bulletin discusses industrial heat processing techniques with radiant gas burners which are said to beam high temperatures to materials at the speed of light.
For More Details Circle No. 106—Page 225

AIR CONTROL VALVES: Logansport Machine Co., Logansport, Ind.—Catalog 100, section 4, gives full data on the company's air control valves and accessory equipment. Typical applications are diagramed and discussed.
For More Details Circle No. 107—Page 225

SAFETY EYEWEAR: Bausch & Lomb Optical Co., 635 St. Paul St., Rochester 2, N. Y.—Slide type selector chart is designed to aid industrial safety directors in choosing the proper safety glasses for 69 specific jobs.
For More Details Circle No. 108—Page 225

FIRE EXTINGUISHER CHART: Ansul Chemical Co., Marinette, Wis.—Periodic inspection chart provides space for 26 inspections of up to 38 fire extinguishers as a help to fire inspectors in keeping accurate records of extinguishers.
For More Details Circle No. 109—Page 225

BLOWERS: Standard Stoker Co., 370 Lexington Ave., New York 17—Publication 86 lists various capacities possible in the company's blowers when direct connected to standard speed motors.
For More Details Circle No. 110—Page 225

BLOWERS: Standard Stoker Co., 370 Lexington Ave., New York 17—Bulletin 88 gives dimensional and other data on the company's line of blowers.
For More Details Circle No. 111—Page 225

CONVEYORS: Barber-Greene Co., Aurora, Ill.—Catalog RF provides information and specifications on sectional truss belt conveyors and related equipment.
For More Details Circle No. 112—Page 225

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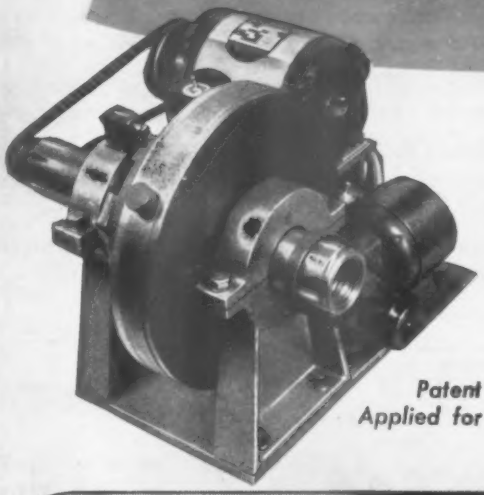

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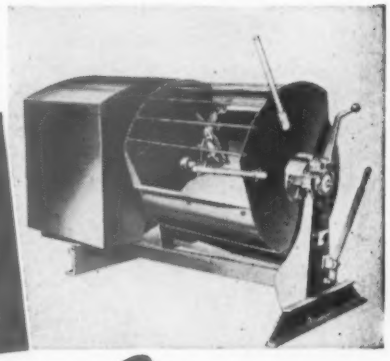

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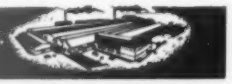

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1938— AFA questionnaire revealed that 8% of steel casting men used radium radiography.

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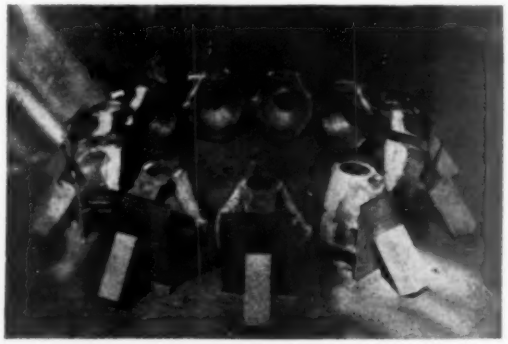

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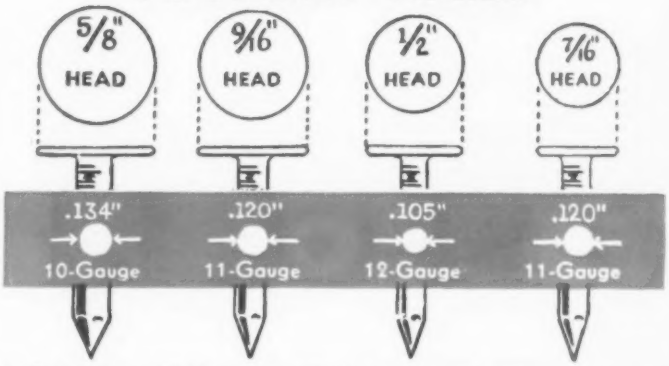

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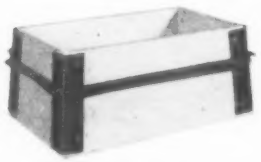

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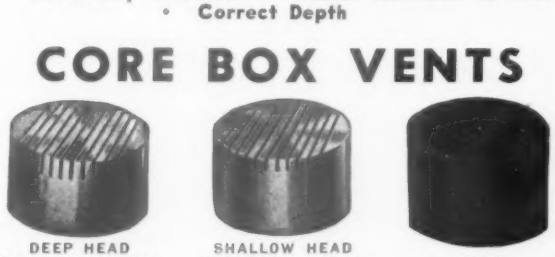

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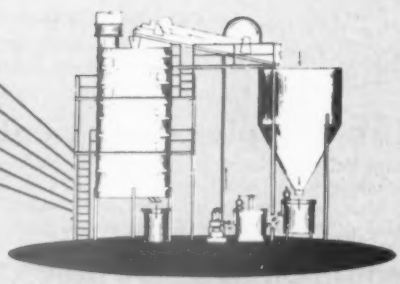

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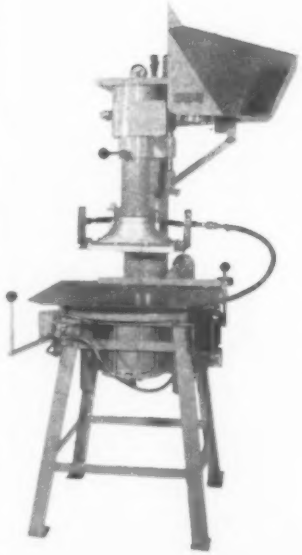

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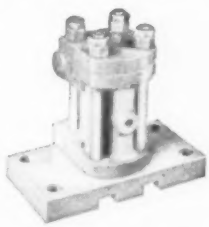

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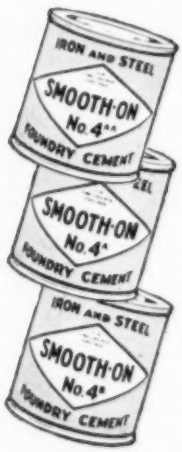

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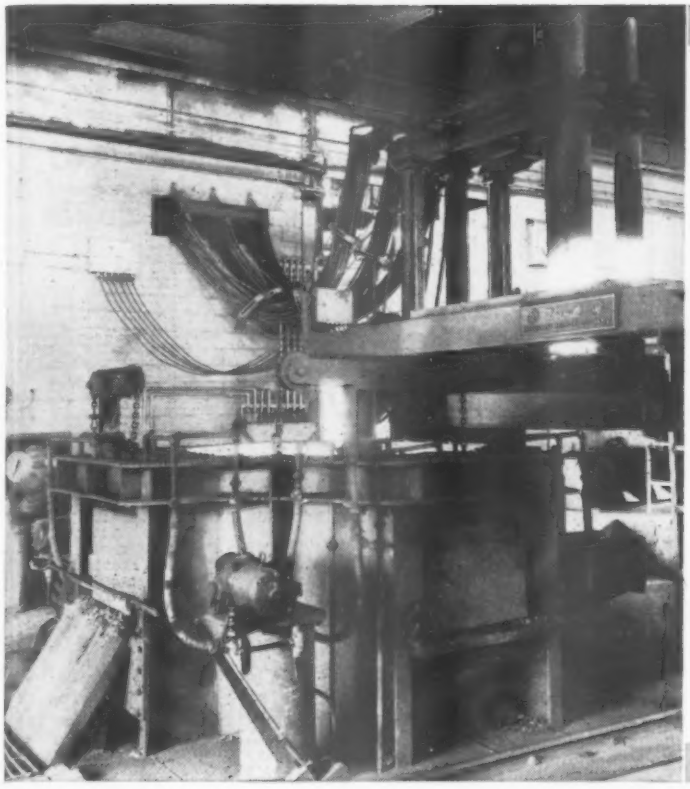

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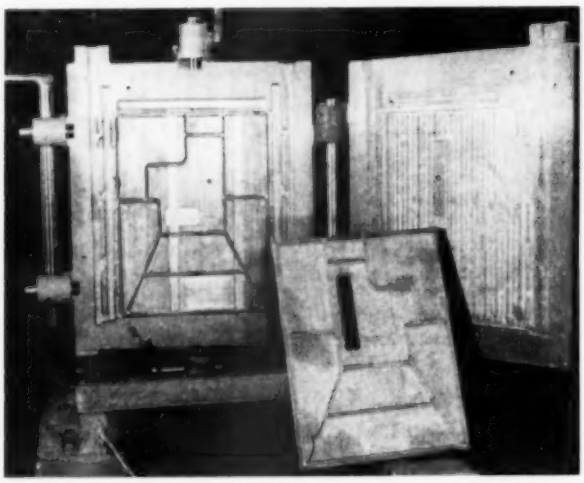

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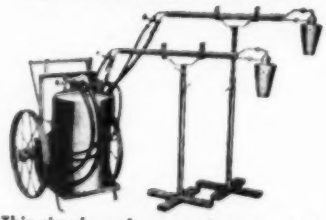

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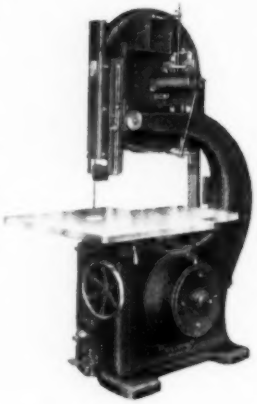

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Wedron Silica Co., 38 So. Dearborn St., Chicago, Ill.

SILICOMANGANESE

Electro Metallurgical Div. Union Carbide & Carbon Corp., 30 E. 42nd St., New York 17, N. Y.

SILICON (Briquets)

Electro Metallurgical Div. Union Carbide & Carbon Corp., 30 E. 42nd St., New York 17, N. Y.
Ohio Ferro-Alloys Corp., Canton 2, Ohio.

SILICON CARBIDE (Briquets)

Carborundum Co., Perth Amboy, N. J.

SILVERY PIG IRON see Pig Iron (Silvery)

SKIMMERS

Tamms Industries Inc., 228 N. LaSalle St., Chicago 1, Ill.

SKIP HOISTS

Beardsley & Piper Co., The, 2424 No. Cicero, Chicago 39, Ill.
Gardner-Denver Co., Quincy, Ill.
Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.
National Engineering Co., 549 W. Washington St., Chicago 6, Ill.
Robins Conveyors Div., Hewitt-Robins Inc., 270 Passaic Ave., Passaic, N. J.
Whiting Corporation, 15607 Lathrop Ave., Harvey, Ill.

SLIP FLASKS

Adams Co., Dubuque, Iowa.
Hines Flask Co., 3431 W. 140th St., Cleveland 11, Ohio.

SLINGS (Chain)

Jeffrey Mfg. Co., Columbus 16, O.
Link Belt Co., 300 W. Pershing Rd., Chicago 9, Ill.

SLIP JACKETS

Adams Co., Dubuque, Iowa.
Chicago Mfg. & Distributing Co., 1928 W. 46th St., Chicago 9, Ill.
Federal Foundry Supply Co., 4600 E. 71st St., Cleveland 5, O.
Fremont Flask Co., Fremont, O.
Hines Flask Co., 3451 W. 140th St., Cleveland 11, Ohio.

SMELTERS & REFINERS

Federated Metals Div., American Smelting and Refining Co., 120 Broadway, New York 5.
R. Lavin & Sons Inc., 3426 So. Kedzie Ave., Chicago 23, Ill.

SNAGGING WHEELS—See ABRASIVE WHEELS

SNAP FLASKS

Adams Co., Dubuque, Iowa.
Diamond Clamp & Flask Co., Richmond, Ind.
Federal Foundry Supply Co., 4600 East 71st St., Cleveland 5, Ohio.
Hines Flask Co., 3431 W. 140th St., Cleveland 1, Ohio.

SODA ASH

Federal Foundry Supply Co., 4600 East 71st St., Cleveland 5, Ohio.
Hercules Powder Co., Wilmington 99, Del.
Mathieson Chemical Corp., Mathieson Bldg., Baltimore 3, Md.
Solvay Sales Division Allied Chemical & Dye Corp., 40 Rector St., New York 6, N. Y.

SOLDER

Federated Metals Div., American Smelting and Refining Co., 120 Broadway, New York 5.

SPACE HEATERS

Dravo Corp., Neville Island, Pittsburgh 25, Pa.

SPECIAL FOUNDRY ALLOYS

Federated Metals Division of American Smelting and Refining Co., 120 Broadway, New York 5, N. Y.
Niagara Falls Smelting & Refining Div. Continental-United Industries Co., Inc., 2204 Elmwood Ave., Buffalo 17, N. Y.
Vanadium Corp. of America, 420 Lexington Ave., New York, N. Y.

SPRAY GUNS

Murphy & Co., Jas. A., Hamilton, O.
New Haven Vibrator Co., 131 Chestnut St., New Haven 7, Conn.

SPRUE CUTTERS

Adams Co., Dubuque, Iowa.
Federal Foundry Supply Co., 4600 East 71st St., Cleveland 5, Ohio.
Freeman Supply Co., 1152 East Broadway, Toledo, Ohio.
Milwaukee Chaplet & Mfg. Co., 1023 S. 40th St., Milwaukee, Wis.
Rice Pump & Machine Co., 1025 S. 40th St., Milwaukee 15, Wis.

STACKING BOXES

Palmer-Shile Co., 1600 Fullerton Ave., Detroit 27, Mich.

STEEL SHOT

Pangborn Corp., Hagerstown, Md.
Steel Shot Producers, Inc., Butler, Pa.

STEEL (Structural)

American Bridge Co., Pittsburgh 19, Pa.
Inland Steel Co., 38 So. Dearborn St., Chicago 3, Ill.

STOPPERS (Graphite)

Joseph Dixon Crucible Co., Monmouth St., Jersey City, N. J.

STRAINER CORES

Harbison-Walker Refractories Co., 1745 Farmers Bank Bldg., Pittsburgh 22, Pa.

STRIPPING MACHINES

Adams Co., Dubuque, Iowa.
Champion Foundry & Machine Co., 1553 W. Madison St., Chicago 7, Ill.
Davenport Machine & Foundry Co., Davenport, Iowa.
International Molding Machine Co., LaGrange Park, Ill.
Milwaukee Foundry Equipment Div., Spo Inc., 3238 W. Pierce St., Milwaukee 4, Wis.

SURFACE TREATMENT METALS

Pangborn Corp., Hagerstown, Md.

TANKS (Dewatering)

Claude B. Schneible Co., 2827 25th St., Detroit 16, Mich.

TAPER PINS

Standard Horse Nail Corp., New Brighton, Pa.

TELLURIUM

American Smelting & Refining Co., 120 Broadway, New York 5, N.Y.

TEMPERATURE CONTROLLERS

Foxboro Company, Foxboro, Mass.
Illinois Testing Laboratories, Inc., 418 N. LaSalle St., Chicago 10, Ill.
Marshall Co., L. H., 270 W. Lane, Columbus 1, O.

TESTING EQUIPMENT

Detroit Testing Machine Co., 19390 Grinnell Ave., Detroit 13, Mich.
Steel City Testing Machines Inc., 8843 Livernois Ave., Detroit 4, Mich.

TESTING LABORATORIES

Harry Dietert Co., 9330A Roselawn Ave., Detroit 4, Mich.

—When writing advertisers, please mention THE FOUNDRY—

Classified Advertising

Positions Wanted

FOUNDRY SUPERINTENDENT OR MANAGER

Practical, progressive experience of 20 years in gray iron and nonferrous sand castings as journeyman and top executive supervision, qualified to take charge of all operations in job or production foundry. Engineering education, outstanding labor relations, high productivity and low scrap ratio records. My experience includes sales engineering, operation of machine shop tools and layout work. Age 43, desires permanent connection. Address: Box 148, The FOUNDRY, Cleveland 13, Ohio.

GRAY IRON FOUNDRY FOREMAN

Wishes to locate in midwest. Twenty years' practical experience, well versed in all foundry operations—also same training in motion and time study. Address: Box 162, The FOUNDRY, Cleveland 13, Ohio.

INDUSTRIAL ENGINEER

Twenty years of foundry experience both grey iron and steel. Ten years' experience in time study, incentive and costing. Capable of complete installation and maintenance of both incentive and costing. Experience in labor relations. Address: Box 146, The FOUNDRY, Cleveland 13, Ohio.

PRODUCTION MANAGER

Age 42, married. Twenty years' experience various capacities production and purchasing departments. Well versed on planning, requirement and follow up problems. Presently employed as production manager in a steel foundry. Address: Box 147, The FOUNDRY, Cleveland 13, Ohio.

STEEL FOUNDRY MANAGER

Fifteen years' experience covering all phases of steel foundry operation, including application of wage incentives, labor relations, job costing as well as molding, melting, etc. Metallurgical Engineering graduate. Age 38, married. Now employed as general works manager. Address: Box 145, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY SUPERINTENDENT

With twenty-two years' practical experience all operations. Aluminum, malleable, gray iron, metallurgical experience. Good labor relations. Age 40, married. Prefer New England. Address: Box 149, The FOUNDRY, Cleveland 13, Ohio.

PRACTICAL FOUNDRYMAN

If your scrap is high and your costs are up—don't give up—answer this ad. I can help you. Practical foundryman wishing to make change. Have had practical experience in all phases of foundry operations. Gray iron, high strength iron, brass and bronze. Can furnish references. Address: Box 156, The FOUNDRY, Cleveland 13, Ohio.

FOREMAN OR SUPERINTENDENT

Desires position in gray iron or nonferrous, production or light jobbing soil pipe. Farm implements. Western New York preferred but not essential. Address: Box 118, The FOUNDRY, Cleveland 13, Ohio.

PERMANENT MOLD FOUNDRYMAN

Graduate metallurgist with 16 years' sound technical and practical background in the field of aluminum die and permanent mold castings. Capable of handling any and all phases of permanent mold work from job estimating and equipment design to supervision of foundry operations. Experienced in both large and small scale operations. Address: Box 906, The FOUNDRY, Cleveland 13, Ohio.

SALES WORK

SIX YEARS COLLEGE WORK. TEN YEARS TRAINING IN GREY IRON AND MALLEABLE. ENJOYS TRAVELING AND EXCHANGING IDEAS. ADDRESS BOX 154, THE FOUNDRY, CLEVELAND 13, OHIO.

FOUNDRY MASTER MECHANIC

Over thirty years' experience in modern foundries, can take complete charge of foundry maintenance. Supervised men past 25 years. Background tool designer and engineering school. Will take position with modern foundry only. Address: Box 974, The FOUNDRY, Cleveland 13, Ohio.

Positions Wanted

WANTED

Training program for young metallurgist with one year's experience chemical analysis gray iron and malleable and cupola operation. Position with supervision as goal. Location not important. Address: Box 167, The FOUNDRY, Cleveland 13, Ohio.

STEEL FOUNDRY

Practical and technically trained on jobbing and production. Ranging from one pound to forty thousand. Served apprenticeship as molder. Twenty years' supervisory. Last with Detroit Steel—plant discontinued. Address: Box 170, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY MANAGER OR SUPERINTENDENT

Thirty years in British and American gray iron and nonferrous foundry control. Experienced in patternmaking, rigging, molding and melting for production. Can furnish references. Address: Box 173, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY SUPERINTENDENT

Thirty years' experience, excellent record, top references. Prefer shop with large castings. Fifteen years at one company. Address: Box 174, The FOUNDRY, Cleveland 13, Ohio.

CORE ROOM FOREMAN

Twenty-five years' experience in large production foundry. Cores made for iron and steel rough and pressure castings. Had foreman and 65 coremakers under me. Address: Box 176, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY SUPERINTENDENT OR PRODUCTION MANAGER

Desire position with steel foundry. 20 years' experience as Foundry Superintendent. 10 years' experience as Production Manager. High yield and low scrap. Can furnish good references. Address: Box 135, The FOUNDRY, Cleveland 13, Ohio.

FOUNDRY SUPERINTENDENT

Twenty years' experience, twelve years as superintendent with light to heavy jobbing and production work and highly alloyed irons. Practical and technical experience in every phase of the foundry. Presently employed but desire heavier line of work. Address: Box 140, The FOUNDRY, Cleveland 13, Ohio.

Foundries For Sale

FOUNDRIES FOR SALE

SOIL PIPE FOUNDRY, fully mechanized. Good location. Large backlog of orders.

GRAY IRON FOUNDRY, well established steady business. Modern equipment. Owner retiring.

EDWARD H. ZOLL
INDUSTRIAL PROPERTIES
THROUGHOUT THE EAST
790 BROAD ST. NEWARK, N. J.

BRASS FOUNDRY AND MACHINE SHOP

Elmira, N. Y. Fully equipped plant, plot 100 x 125, RR siding, building 1 story, 8,600 sq. ft., must sacrifice. Address: HAROLD J. JACOBS, 17 ACADEMY ST., NEWARK, N. J. MARKET 3-2626.

Foundries For Sale

FOR SALE

General jobbing brass and aluminum foundry in South Jersey close to Philadelphia. In operation since 1921. Price $25,000 including land and equipment and good will. Owner retiring owing to age. Address: Box 143, The FOUNDRY, Cleveland 13, Ohio.

GRAY IRON FOUNDRY

Completely modern, pouring 3 to 4 tons a day profitable record; making a product well established—16 employees. Cupola and Stroman gas fired Sklenar furnace. The only industry in town of 2500 people, located in central Pennsylvania—total price $40,000 cash. Address: Box 152, The FOUNDRY, Cleveland 13, Ohio.

FOR SALE

Will sell for $40,000 brass and aluminum foundry, manufacturing side lines. Old established firm since 1918. Business up to $25,000 per month. Located in Southeastern Wisconsin. Owners retiring. Address: Box 159, The FOUNDRY, Cleveland 13, Ohio.

FOR SALE OR LEASE

Grey iron brass and aluminum foundry located in Upland, California. Address: J. L. BULLOCK, RT. 1 BOX 441, MIRA LOMA, CALIFORNIA.

Employment Service

SALARIED POSITIONS
$3,500-$35,000

If you are considering a new connection communicate with the undersigned. We offer the original personal employment service (40 years recognized standing and reputation). The procedure, of highest ethical standards, is individualized to your personal requirements and develops overtures without initiative on your part. Your identity covered and present position protected. Send only name and address for details.

R. W. BIXBY, INC.
101 DUN BLDG. BUFFALO 2, N. Y.

EMPLOYERS
SERVICE BUREAU
A SUPERIOR PERSONNEL SERVICE
ESTABLISHED 1922
EMPLOYERS
ESTABLISHED 1922

Specializing in the procurement and placement of foundry personnel. All cases handled by a counsellor with 15 years experience in foundry, pattern shop and machine shop.

APPLICANTS:
We need your application on file for immediate action on all the good and sometime exceptional job opportunities offered by more than 2,000 firms who rely on us for their personnel requirements. All in strict confidence.

PRESENT REQUIREMENTS
(A partial listing)

SUPERINTENDENTS to $10,000
Aluminum-permanent molds. Aluminum-sand. Electric steel-jobbing. Gray iron-motor blocks, heads. Gray iron-general jobbing. Brass-plumbing goods. Jobbing Machine and Foundry.

ASST. SUPERINTENDENTS to $7,200
Gray iron-general jobbing. Gray iron-production.

FOREMEN to $6,000
Molding, coremaking, melting, cleaning.

INDUSTRIAL & TIME STUDY ENGRS.
to $6,000
Time and methods—gray iron. Supervision all industrial eng'g. and costs. fdry. and machine. Time study—steel, malleable, gray iron shops.

MAINTENANCE SUPERVISORS to $7,000
Master Mechanic—elect. steel. Supt., gray iron.

METALLURGISTS to $6,000
Gray iron, steel, nonferrous.

ENGINEERS-DESIGNERS to $6,000
Plant Eng'g. Permanent mold, pattern design.

WRITE
JOHN COPE
EMPLOYERS SERVICE BUREAU
6 N. MICHIGAN AVE., SUITE 708
PHONE: FINANCIAL 6-1155
CHICAGO 2, ILLINOIS

Classified Advertising

Employment Service

SALARIED PERSONNEL

$3,000-$25,000. This reliable service, established 1927, conducts confidential negotiations for high-grade men who seek a change of connection under conditions assuring, if employed, full protection to present position. Send name and address only for details. Personal consultation invited. Address: JIRA THAYER JENNINGS, 241 ORANGE STREET, NEW HAVEN 10, CONN.

Available Capacity

AVAILABLE CAPACITY

Our foundry has open capacity to supply small and medium size gray iron castings. Send sample. Address: OREGON CASTINGS CO., RD 3, Lititz, Pa.

Wanted-To-Buy

WANTED

An annealing oven of the following approximate inside dimensions: 20 inches high, 42 inches wide and 72 inches long. Hearth area not less than 21 square feet. Prefer oven fully equipped with temperature controls. Advise price, condition and location. Address: Box 168, The FOUNDRY, Cleveland 13, Ohio.

WANTED

Microscope, metallurgical type 100X to 500X. State condition. Also want copy of "The Microscope in Elementary Cast Iron Metallurgy" by R. M. Allen. Address: **HELMICK FOUNDRY-MACHINE CO., FAIRMONT, W. VA.**

WANTED

Model #92 Osborn core blowing machines also Heavy Duty Shakeouts either 4'x7' or 5'x8'. Must be in good condition. State age, price and serial number. Also Steel Apron Conveyor—24" width and 36" width or wider, minimum thickness 3/8" with or without motor. Advise length, condition and price. Sterling steel flasks, 14x16, with 4" cope and 4" drag, 24" rubber conveyor belting, new or used, 27" steel roller conveyor. Address: Box 138, The FOUNDRY, Cleveland 13, Ohio.

MIXERS WANTED

Used Simpson Intensive Sand Mixers. State size, condition and lowest cash price or immediate acceptance. Address Box 578, The FOUNDRY, Cleveland 13, Ohio.

WANTED

One #2 National areator for a #2 Simpson-Muller, one National screening unit and magnetic separator for #2 Simpson-Muller. State condition and price in first reply. Address: Box 978, The FOUNDRY, Cleveland 13, Ohio.

For Sale

FOR SALE

The equipment listed is almost new and priced to sell!!

1—Osborn Type 405-77 Jolt Rollover and Pattern Draw—Size—64" x 50"—with runout car.
6—Osborn Type 2047—Jolt Rollover and Pattern Draw—Size—24" x 24".
1—Newago Core Crusher—12" x 36"—10 Ton per hour.
2—International Clamp and Draw—76" x 9½" Draw.
1—Kane and Roach Core Wire Straightener—No. 5 DX—3/8" capacity.

All equipment can be inspected at our warehouse and immediately available.

GLOBE TRADING COMPANY
1817 FRANKLIN STREET
DETROIT 7, MICHIGAN
PHONE: WOODWARD 1-8277

For Sale

FOR SALE

MOLDING MACHINES
1—74W Osborn Plain Squeeze Portable
2—75W Osborn Plain Squeeze Portable
3—75J Osborn Jolt Squeeze Portable
3—Federal RAPID Jolt Squeeze Portable
2—SPO #611B Stationary Oscillating Jolt Squeeze Strippers
1—SPO #4½ JHS Air Jolt Hand Strip
BLOWERS FOR CUPOLAS AND FURNACES
1—40 H.P. Spencer-Turbine 5100 CFM 18-oz. pressure
1—Piqua Rotary Pressure Blower, rated 19 cu. ft per Rev.
Maxon-Premix Blowers for Gas, ¼ to 1 H.P.
METAL MELTING EQUIPMENT
1—Stationary crucible aluminum furnace, gas fired, 400# cap. complete with blower and motor
1—Hausfeld 2000# Aluminum Capacity Furnace, Barrel Type, open flame, oil fired
New 32" to 41" Dia. shell Cupolas made to order
TUMBLING MILLS AND SAND BLAST
5—28 x 60" round exhaust mills
1—Pangborn No. 2 GH direct pressure type sandblast barrel, motor driven. Complete Unit
1—Pangborn Sand Blast Unit, including generating tank, shot cleaner, bucket elevator. Suitable for use with room
MISCELLANEOUS
1—No. 1 Simpson mixer, 4" pan, unit drive, motor direct connected.
7—Crane ladles, worm gear tilt, 1000 to 14,000# capacity
1—Continuous Heat Treat Furnace 57' long 1200° F. Max.
5—Koch electrically heated ovens for baking cores, 4½ ft. wide, 6 ft. high, 6 ft. deep, complete with recirculating fan and controls
1—Young Bros. Tower Core Oven, 5 ft. x 1 ft. shelves, gas fired, complete with Foxboro control
1—Lamson Endless Mold Conveyor, 100 ft. long x 16 ft. wide, with 19 x 26" pallets, 36" on centers
1—Bucket Sand Elevator, 50 ft. tall, complete
4—Heavy Duty Flexible Shaft Grinders 2 H.P.
Ingersoll-Rand air hoists, 2, 3, 5 ton cap.

CLIFTON MACHINERY CO.
1023 W. SIXTH ST. CINCINNATI 3, OHIO

FOR SALE

27 x 36" American Wheelabrator tumblast and loader. Excellent condition. Address: Box 115, The FOUNDRY, Cleveland 13, Ohio.

MAGNETIC SEPARATOR

1—Model 5-14-46 tote all scrap saver powered by 2HP-3PH-60 cycle-220 volt geared head motor.

WOODRUFF & EDWARDS, INC.
119 N. STATE ST. ELGIN, ILLINOIS

FOR SALE

One #8 Whiting cupola.
One size 6, Roots-Connersville cupola blower with 60 H.P., 900 R.P.M. G.E. motor, v-belt drive.
One #M10 Foxborough Air Weight Controller.
The above equipment is in operating condition and must be removed in the immediate future. Offered at bargain price.

HOLLAND FURNACE COMPANY
HOLLAND, MICHIGAN

FOR SALE
ROLLOVER MOLDING MACHINES

2—International—Type G 32" table, 12" draw
1—815 Johnston & Jennings 30" x 40" table—15" draw
1—602 Osborn—30" table—11" draw
1—10 HP Cincinnati Snag Grinder, 20" wheel
1—54" Beasley Horizontal Disc Grinder
Also gas and electric platform and fork lift trucks.

BALCHER MACHINERY COMPANY
1884 S. COMPTON ROAD
CLEVELAND HEIGHTS 18, OHIO
TEL: FAIRMOUNT 1-1186

For Sale

FOR SALE
FOUNDRY EQUIPMENT

MOLDING MACHINES
2 "Osborn", mod. 405 jolt rollover
2 "Osborn", mod. 560-20 jolt stripper
2 "Osborn", mod. 602 jolt rollover
1 "Davenport", mod 40AJS jolt stripper
CORE MACHINES
1 "Taber" pedestal type rollover—F21-19.7
3 Grimes Model C-216 rollover
3 Grimes Model C-414 rollover
FURNACES & OVENS
9 "Hausfeld" 100# cap., pot type melting—oil fired
23 "Hausfeld" 200# cap., pot type melting—oil fired
4 "Hausfeld" 400# cap., pot type melting—oil fired
3 "Hausfeld" 1000# cap., tilting type melting—oil fired
6 "Hausfeld" 1200# cap., tilting type melting—oil fired
SAND MIXERS
1 "Simpson" #2, sand mixer
4 "Simpson" #1½, sand mixer.
MISCELLANEOUS
1 Surface table "Milwaukee" 48 x 72
2 "Tannewitz", mod. R1E, 42" band saw
1 Grinder, snagging, "U. S." double end, 30" wheel with 5 HP motor
10 Flexible shaft grinders, "Haskins"
1 "Kane & Roach" #50X wire straightener—¼" cap.
1 Shakeout, "Simplicity", mod. "B", 4' x 6' with 5 HP motor
5 Jib cranes with 2 ton air hoists
8 Cranes, overhead traveling, bridge type, approx. 38' span 1 & 2 ton
5 Cabinet collectors, "Newcomb-David" wet dust type with pumps, blowers and motors
Flasks; aluminum, steel, magnesium and snap
Bottom boards; aluminum, magnesium and transite
1 Economy portable lifter cap. 1000 lbs (less transmission)
350' 24" 6 ply conveyor belt—new
3 Detroit Hoists 1 ton cap., 1 HP motor, type M (DC)
6 Detroit Hoists 2 ton cap., 2½ HP motor, type M (DC)
1 Detroit Hoist 4 ton cap., 7½ HP motor, type LHR (DC)
5 Chicago Pneumatic Air Hoists 2 ton cap. Model A, reversing eccentric
1 Magnetic pulley 24" dia.
1 Magnetic pulley 20" dia.
1 Milling machine, "Van Norman" 2M-5049 hand type 1½ HP motor.
1 Graham variable speed transmission Model 60M, Type 101386, Serial 15669
1 Sand strength testing machine "H. W. Dietert" #400
1 Permeability meter, "H. W. Dietert" #320
1 Sand rammer "H. W. Dietert" #310
1 Sieve shaker, "Ro-Tap" with fractional HP motor
1000 lb capacity Magnesium melting pots
200 lb capacity Magnesium melting pots
100 lb capacity Magnesium melting pots

ROHN ALUMINUM & BRASS CORP.
1400 LAFAYETTE BLDG. DETROIT, MICH.

SPECIAL SALE ON JOLT SQUEEZERS

Following Machines have been completely rebuilt and in A-1 shape.
3—10" Haynes, Portable. Price $185.00 each.
12—Osborn J-75, Portable, Strand Rod Type, 10" squeeze piston, 3" jolt piston—$165.00 each.
1—International, Portable, Strand Rod Type, 9" squeeze cylinder, 3" jolt cylinder—$165.00.
3—Adams, Portable, Strand Rod Type, 10" squeeze cylinder, 4" jolt cylinder—$165.00 each.
2—Milwaukee, Portable, Swing Head Type, 10" squeeze cylinder, 4" jolt cylinder—$175.00 each.
4—Milwaukee, Stationary, Swing Head Type, 10" squeeze cylinder, 4" jolt cylinder—$175.00 each.
1—Tabor, Portable, Cantilever Type—$165.00.
2—Milwaukee, 12" Stationary, Swing Head Type—$200.00 each.
1—Milwaukee, Stationary, 13" squeeze cylinder, 7" jolt cylinder—$210.00.

HAYNES FOUNDRY EQUIPMENT CO.
814 ADA ST. KALAMAZOO 52, MICH.

Classified Advertising

For Sale

FOR SALE

145—Sterling Steel Flasks—1 Pin on each side —12 x 18, 3 Cope & 3 Drag.
119—Truscon Steel Flasks—1 Pin on each side —12 x 18, 3 Cope & 3 Drag.
These Steel Flasks are practically new.
2—Tabor, Air Jolt, Rollover Machines 14 x 16 Table.
1—American Sand Cutter, Gasoline Driven.
1—Johnston & Jennings 24 x 30 Rollover.
1—Tabor 30 x 40 Rollover Machine.
1—27 x 36 Wheelabrator.
1—#9 Whiting Cupola complete with Motor, Blower, and Blast Regulator.
10—"G" Power Rollover Machines.
15—Jolt Squeezers of most any make.
1—Automatic lift truck with charger.
1—50" Moulder's Friend Sand Cutter with 15 HP Motor.
1—Grinding Wheel Stand 3 x 24" Wheels.
1—Marshke Swing Grinder with 5 HP Motor.
1—Stearns Magnetic Pulley, New. Serial #20442, 125 volts, RPM 40. Manufactured by Stearns Magnetic Mfg. Co., Milwaukee, Wisconsin.
1—Motor Generator Model #498 Induction motor generator set ⅝ KW diverter pole generator. 125 volts @ 6 amp DC with 1½ HP 220/440/60/30 Across the line motor. New.
1—30 x 48 Tumbling Mill with motor, V-belt drive.
1—36 x 60 Tumbling Mill with motor, V-belt drive.
1—30 x 60 Whiting Mill with motor, V-belt drive.
1—SPO Jolt Squeeze Pin Lift Machine No. 614-P, Serial #122. Pattern No. 2138410.
1—"F" rod straightener with Jaeger attachment.
Osborn 558 and 559 Jolt Strippers.
Belting, New. 187 Ft. Ajax 20" 5 Ply 28 oz. conveyor belting with ⅛" top and 1/32" bottom cover.
J.D.P. International Jolt Strippers.
15—J-275 Osborn jolt squeezers
15—J-76 Osborn jolt squeezers

HAYNES FOUNDRY EQUIPMENT CO.
814 ADA ST. KALAMAZOO 52, MICH.

AMERICAN 89/20" MODEL "M" SANDCUTTER

Real opportunity to obtain at a substantial saving a model "M" sandcutter in excellent condition. Only four years old, it will provide many years of rugged service in unexcelled low cost sand conditioning. Ready to go to work on your foundry sand immediately.

ZENITH FOUNDRY COMPANY
1501 SOUTH 83rd STREET
WEST ALLIS 14, WISCONSIN

FOR SALE

1 Chicago Pneu. Air Compressor 85 Cu. ft. at 100# with 25 H.P.—A.C. 220/60/3 Motor and Starter
1 Double end Stand Grinder with 5 H.P. Motor and 2—16" wheels
1 Pneumatic tire Core Carrier, 1000# Capacity
1 Gardner #24 Disc Grinder, 53"
1 99/80 Model M American Sand Cutter 220 Volt 3 phase with 75 ft. cord and plugs
1 Modern Equipment Company one ten double channel Crane—13 ft. 5 in. span
1 Electric IBM time Clock—type 8700-5 serial 849611 with 200 card rack, 4 horns, transformer and relays
1 Champion Stripping plate machine—26 x 33
1 SPO #508 Jolt rollover draw machine 28 x 36 x 10"
1 SPO #506 Jolt rollover draw machine 24 x 24 x 10"
1 International type PKL 12 x 5½" jolt squeeze pin lift machine
1 One ton electric crane and hoist 50 ft. span
1 Drawer type gas core oven
1 Large Royer—Model D portable
1 Small Royer—Model C2 portable
1 30 x 84 tumbling mill
1 Chicago Pneu. 5 ton hoist with trolley

WRITE: BADGER FOUNDRY COMPANY
WINONA, MINNESOTA

Location of equipment
BADGER FOUNDRY COMPANY
1331—18th STREET
RACINE, WISCONSIN

For Sale

GOOD USED EQUIPMENT

Sly Dust Collecting System, consisting of 3 Sly #62, Type 360 Dust Filters, to handle 15,000 CFM each. Motors 220/440/3/60. Was erected, but not used.
2—5-Ton Bridge Cranes, 30' span, 3 motor, cab operated, 230 volt DC, equipped with Magnet controller and enclosed cab.
1—3-Ton Shaw, 44'5" span crane, with load lifter hoist, 220 volts, 3 phase, 60 cycle, floor controlled.
1—#2 Packer-Matic, 12 Station, Rotary Buffing and Polishing Machine. Motors 220/440/3/60.
1—Model #60 Cullen-Friestedt 6000 lb. Welding Positioner 220/440/3/60.

IRA C. JORDAN,
2508 EAST BELLEVIEW PLACE,
MILWAUKEE 11, WISCONSIN

FOR SALE

1—Osborn No. 147-3 hydraulic draw core machine, hand ram, hand roll over, equipped with hydraulic draw operation and air operated clamps $1,000.00
1—Osborn No. 147-1 core machine, hand ram, hand roll over $1,000.00

LAKE CITY MALLEABLE CO.
5000 LAKESIDE AVENUE
CLEVELAND 14, OHIO

FOR SALE

Gardner-Denver stationary air compressor, 125 lb. air pressure, Model WBE 3005, Serial #82625. Vertical three state—7 & 5¾ x 5 three cylinder—water cooled—40 Horse Motor 220 or 440 direct drive. Guaranteed like new.
One 24 inch Delta Band Saw—wood and metal cutting. New condition.

BOX 155
THE FOUNDRY CLEVELAND 13, OHIO

FOR SALE

Complete pattern equipment for malleable pipe fittings, sizes ⅜" to 2", or will cooperate with a foundry to produce on percentage arrangement. Address: LAKESIDE FOUNDRY, WARSAW, INDIANA.

FOR SALE
FOUNDRY MACHINES AND EQUIPMENT

As a result of discontinuing foundry operations a large Western Massachusetts manufacturing Company has the following foundry machinery and equipment for sale:

GE Centrifugal blower rated at 7100 CFM at 1.25 lbs. 550 Volt 60 Cycle 58 HP Motor with controls	1,000
Spencer Turbo Compressor with 7½ HP 550 Volt 60 Cycle Westinghouse Motor	200
Spencer Turbo Compressor with 10 HP 550 Volt 60 Cycle Robbins & Meyers Motor	400
Besley Vertical Spindle Grinder for 53" x 1" x 8" wheel equipped with 10 HP 550 Volt 60 Cycle Motor	500
TABOR MOLDING MACHINES:	
13" x 18" Split Pattern Stripper	200
13" x 18" Split Pattern Stripper	500
6-10" Jar Squeezer ..... each	75
22" x 40" Shockless Jarring Portable Rollover	800
OSBORN MOLDING MACHINE Model 553 Jolt Pin Lift	250
Sand Cutter—American 99/80M with 220 Volt 60 Cycle Motors	4,650
Jarecki Type BB Screw Press	150
GRINDERS, Portable 17,000 RPM Pneumatics #0 Ingersoll-Rand with #290 Collett	20
8—#2 E5—Ingersoll-Rand ..... each	25
Hercules	25
CHIPPING HAMMERS:	
2—Cleveland #1W Style BH Pneumatic ..... each	10
7—Ingersoll-Rand 100# Pneumatic each	10
ALPHA LUX SPEEDY MOISTURE TESTER	75

The above items have been priced for quick sale and may be inspected at our plant. All orders will be accepted subject to prior sale, net cash, f.o.b. truck or cars at our plant. If you wish further information or would like to make an inspection, write

BOX 169
THE FOUNDRY CLEVELAND 13, OHIO

For Sale

FOR SALE

1—#4 Whiting Cupola W/new 2700 C.F.M. "North American Turbo-type Blower, 220-440V, 3 ph. 60 cy.
1—Whiting Elevator 1 ton cap. 20' lift (air operated)
1—Sly Sandblast room Type "F", size 8' x 8' x 10' with exhaust fan, bucket, hoist & dust collector.
1—Wardwell Saw filing machine & Saw set. Like new.
1—Lanly Recirculating type oven. Completely automatic, oil fired. Max. temperature 500°. Size 9'4" x 6'6" x 8'6" high.
6—Campbell-Hausfeld #200 Stationary Magnesium Melting furnaces.
1—Sklenar Reverbatory type furnace, oil fired. 1 ton capacity w/air ram, blower, 220 V, s ph. 60 cy.
4—Pit-type furnaces. Fisher burners. Oil fired. #250 crucible size.
1—Air Compressor, Gardner-Denver horizontal. Size 10 x 10. W/motor G.E. 40 hp., 200 V., 3 ph. 60 cy.
1—Wheelabrator Tumblast, operated less than 300 hours. Spare parts, Size 27" x 36".
Molding Machines:
2—Tabor Jar ram, hand rollover, hand draw.
3—Johnson-Jennings, Wall type.
1—Arcade Squeeze, 6" cylinder.
2—Osborn Floor bumpers, 1—18" cylinder, table 42" x 60"
1—16" cylinder, table 30" x 36"
2—Universal Sandthrowers—220 V., 3 ph., 60 cy.
Dietert Sand testing equipment: laboratory normalizer, Permameter, Compression machine, Rammer, Moisture teller, scales & weights, A.F.A. Screens.
1—Ames hardness tester.
1—Lincoln Electric welder, 600 amp. 220 V, 3 ph., 60 cy.
3—Gyratory riddles "Speed Sifters" 1/3 h.p. 220 V, 3 ph. 60 cy.
Miscellaneous equipment includes quantity wood snap & metal slip flasks, jackets, bottom boards, wood flasks & bottom boards. Oil stoves, core ovens, ladles, wire cutter & bender. Stand grinders, vises, table saws, blowers, air grinders, chipping hammers, vibrators, pyrometers, wheelbarrows, scales, core racks, etc.

RIDGE CASTING CORP.
MINERAL RIDGE, OHIO

EQUIPMENT FOR SALE

1 24" Pangborn Rotoblast & Dust Arrester
25 Osborn 275 JW stationary jolt squeeze molding machine
1 Fisher Gas fired tilting Furnace, BB1 size 400 Ser. #3283 Silicon carbide lined
1 Ladle hand operated gear driven tilt Ladle, reservoir ladle modern equipment 2000#
7 Lupomatic Tumbling Mills, complete with motors
2 Ryan Electric Core baking Ovens with G.E. Controls
1 Car type Annealing Furnace, gas fired, 39" high, 6' wide, 11" long, complete with controls
1 Mummert Dixon swing frame Grinder 16" wheel
1 Heavy Duty Steel bar or pipe bending machine, with 5 H.P. Motor suitable for gaggers
2 Stiner Ives Core Oven 4 compartment gas fired, size B Ser. 28111 with blower, 1 H.P. Motor
3 Metal Cutting Band Saws
3000 Ft. assorted roller conveyors
4 Charging buckets for Cupola drop bottom 1500# cap.
1 #2 Simpson Mixer with motor
2000 Transite Core Plates, various sizes
100 #150 Clay Graphite Dixons Crucibles Mulbaro

We also carry in stock at all times, Blowers, motors, grinders Wooden, & Steel Tanks. We are always in the market for good used Foundry Equipment.

UNIVERSAL MACHINERY & EQUIPMENT CO.
320 EAST BROAD ST.
SHILLINGTON, READING, PA.
PHONE READING 3-0311 or 4-5137

Classified Advertising

For Sale

FOR SALE

Steel City brinell testing machine, Type A-4—motor operated. Clearance between uprights 3 ft. 8 inches. Maximum height of work possible—51 inches.
Six (6) Edison industrial lift truck batteries Type 24A8-8B.
Three (3) Dravo Floor mounted unit Heaters. Stoker fired—1,000,000 Btu capacity. Stoker equipped to burn buckwheat coal.
Lot of 20 hi-cycle tool grinders wired for 110 V, 3 phase, 180 cycles.
Lot of Hines aluminum heavy duty pop-off flasks. Flask sizes from 12 x 24, 16 x 16, 18 x 24, 24 x 48, 34 x 47, 36 x 36, and 42 x 42.

Two (2) Osborn #332-38 jolt, squeeze, rollover, power draw molding machines, stationary.
Flask capacity: 26 x 36.
Flask space: 18"
Draw: 10".
All equipment in excellent shape.
Complete details available.

LEBANON STEEL FOUNDRY
LEBANON, PA.

PRICED FOR QUICK SALE

2 NEW BARRETT TYPE CUPOLAS, 26" inside diameter, complete with blower. Capacity 2500 lbs. per hour each. Designed for platform loading and suitable for ferrous or nonferrous metals. These were erected but never used.

RANDALL GRAPHITE BEARINGS INC.
LIMA, OHIO

FOR SALE

Brass furnace (2), Randall-twin demonstrating models, excellent condition—price greaty reduced. Address: THE FEDERAL FOUNDRY SUPPLY CO., 4600 E. 71st ST., CLEVELAND 5, OHIO.

FOR SALE

MOLDING MACHINES

1—Osborn, portable type 275J, streamlined.
4—International 20" x 8", Type G
1—International P.K.L., jolt squeeze lift
1—Herman, 1500 series, air clamps

CORE BLOWERS

1—Osborn #193, air draw
1—Demmler #3-E, air draw
1—American Rod Straightener, Type F

RAY P. SCULLY
SCULLY MACHINERY & EQUIPMENT CO., NOT INC.
767 MILWAUKEE AVE. CHICAGO 22, ILL.
PHONE: CANAL 6-0314

FOR SALE
ONE BUTLER CARSCOOP
MODEL 7A6

In fair condition, motor recently reconditioned. Extra parts and motor. Price $450.00. Will give much reliable service.

PELTON STEEL CASTING COMPANY
MILWAUKEE 7, WIS.

FOR SALE

TURBO BLOWERS (3 Phase, 60 Cycle)

cfm	Pressure	Make	Motor H.P.	Volts	Speed
15,000	20 oz.	Ing.Rand	150	440	3570
8700	20 oz.	Ing.Rand	75	220	3500
3500	40 oz.	Spencer	60	440	1800
2200	40 oz.	Spencer	40	220/440	3600
1400	16 oz.	Spencer	220/440	3/60	3600
1000	32 oz.	Spencer	15	220	
900	24 oz.	Spencer	10	220/440	
225	10 oz.	Spencer	1	220/440	3600

PRESSURE BLOWERS (3 Phase, 60 Cycle)

2500	7 oz.	Sturtevant	15	220/440	1800
2400	14 oz.	Mahr	15	220/440	3480
1800	1 in.	Sturtevant	2	220/440	
1150	20 oz.	Nth.Amer.	10	220/440	3600
950	16 oz.	Nth.Amer.			
800	8 oz.	Sturtevant	7½	220/440	3600
800	24 oz.	American	10	220	3600
450	6 lbs.	A&B	30	220/440	3450
1800	1 in.	Sturtevant	2	220/440	
150	12 oz.	Nth.Amer.	1	220	3600

MOTOR REPAIR & MFG. CO.
1552 HAMILTON AVENUE
CLEVELAND, OHIO

SANDCUTTER

American model AA, size 5'2". Fine condition. $2000.00. Address: BARCLAY FOUNDRY Inc., 1555 SOUTH BARCLAY STREET, MILWAUKEE, WISCONSIN.

For Sale

FOR SALE

No. 45 Type M. Pangborn
Blast Cleaning Room
New 1943
with American Air Filter #20. Type W
Roto-Clone Arrangement B.
ALSO
30" Tabor Jolt Rollover
with air operated Flash Clamps.
#601-17 Osborn Moulding Machine.

HOLYOKE MACHINE CO., HOLYOKE, MASS.
Phone 5613

FOR SALE

1—Whiting cupola #4—56" dia. shell, 45 feet to top of stack. New condition, never erected. Prepared to sell at approximately half price.

WARREN FOUNDRY & PIPE CORP.
PHILLIPSBURG, NEW JERSEY

FOR SALE

The following Wood Snap Flasks, all in good condition, $12.00 each, F.O.B. our plant.
Straight Sides:—Width 8" to 13" inclusive
Length 12" to 20" inclusive
Tapered Sides:—11 x 16
11 x 19
12 x 14
13 x 16

Send for list

WERNER FOUNDRY, INC.
LANSDALE, PA.

EQUIPMENT FOR SALE

Stroman Sklenar gas furnace for gray iron and alloy; like new and complete. Can melt 8 tons a day. $3500.

Lamson conveyor 300 feet, caterpillar drive, ceilings suspended, station 12 inches apart, 300 lb. capacity. $1500.

BILLARD MACHINE & TOOL CO.
MANSFIELD, PA.

NEW CLAMSHELL BUCKET

Blaw-Knox ¾ c.y., size 306-1, single line, hook-on-type. Complete. Bowl counterweight. Recommended for rehandling foundry sand. Wt. 2800 lbs. New, guaranteed. Cost.....$1,470.00 A bargain at $1,000.00. Address: Box 951, The FOUNDRY, Cleveland 13, Ohio.

FOR SALE

Remaining equipment of Portland Sandblast Co. to be liquidated consisting of rotoblast machine, sandblasting machines, metallizing gun type 2E, dial Toledo scale, Westinghouse welder and many other items of interest to you. Write: BENNETT & ANDREWS, BOX 4177, PORTLAND 8, OREGON.

FOR SALE

16—13" & 14" combination jolt squeeze strip molding machines, completely overhauled.

SUTTER PRODUCTS COMPANY
2005 WESTWOOD AVENUE
DEARBORN, MICHIGAN

FOR SALE

One Herman rollover moulding machine, late model, in excellent condition, size 40 x 58" 3740 pounds rollover capacity. Equipped with air clamps. Offered at bargain price. Address: Box 861, The FOUNDRY, Cleveland 13, Ohio.

For Sale

FOR SALE

1—Metalwash Model 21A-32 Washing, Rinsing and Drying Machine with all equipment—used one week in shell plant—motors all 3 phase 60 cycle—immediate delivery.
1—Barrett Chip Washer 225# capacity, new.
Large stock of Boilers, Pumps, Tanks and Chemical Equipment.

H. LOEB & SON
4643 LANCASTER AVENUE,
PHILADELPHIA 31, PA.

FOR SALE

1—42" x 48" American Wheelabrator Tumblast with skiphoist, excellent condition.
2—Osborn #276 Jolt Squeeze Molding Machine.
3—Osborn #601 Jolt Rollover Pattern Draw Machines for molding or coremaking.
1—Sly six ft. table blast machine, excellent condition.
1—Pangborn six ft. table blast, used several months, like new.

BOX 172
THE FOUNDRY CLEVELAND 13, OHIO

YOUR CLASSIFIED ADVERTISEMENT IN THE FOUNDRY BRINGS RESULTS!

IF YOU ARE SEEKING A CHANGE OF POSITION TO BETTER YOUR SITUATION AND ARE QUALIFIED FOR A BETTER JOB, TELL THE 35,000 READERS OF THE FOUNDRY ABOUT IT.

DON'T "HIDE YOUR LIGHT UNDER A BUSHEL"—THERE ARE TIMES WHEN A MAN SHOULD TALK ABOUT HIMSELF AND THERE ARE A LOT OF MEN QUALIFIED FOR BETTER POSITIONS WHO DO NOT KNOW HOW TO GO ABOUT IT OR WHERE TO SEEK HIGHER RESPONSIBILITIES.

YOUR CLASSIFIED ADVERTISEMENT IN THE FOUNDRY WILL BE WIDELY READ AND THE RESULTS MAY SURPRISE YOU!

IT COSTS BUT LITTLE. WHY NOT RUN AN ADVERTISEMENT ABOUT YOURSELF IN TWO OR THREE ISSUES?

WRITE
THE FOUNDRY
CLASSIFIED ADVERTISING DEPT.
PENTON BLDG., CLEVELAND 13, OHIO

A Voluntary Liquidation by

PUBLIC AUCTION

Conducted According to Conditions & Rules Posted on Premises

Attention STEEL PRODUCERS FOUNDRIES, FABRICATORS

HEAVY INDUSTRIES
DEFENSE CONTR'S

Land, Modern Buildings, Equipment, Materials, etc. of

MACHINED STEEL CASTINGS CO., ALLIANCE, OHIO

Tuesday, Sept. 19, 1950

STARTING 11:00 a.m. D.S.T.
Inspection Aug. 21 to Date of Sale

Offered in Bulk, Parcels, and Partly Piecemeal

PLANT PACKAGE:

The following facilities will be included in the offering of the Real Estate, and also offered piecemeal. 100,000 square feet of modern heavy industrial buildings on approx. 18 acres land.

2—15-ton Alliance Cranes, D.C., 75′ span.
2—30-ton Alliance Cranes, D.C., 75′ span.
1—15-ton Alliance Crane, D.C., 90′ span.
1— 5-ton Alliance Crane, D.C., 28′ span.
1— 3-ton Alliance Crane, D.C., 28′ span.
2—150 KW Rotary Converters.
2—IR Compressors, 20″ x 12½″ x 14″.
Pumps, Boilers—Lockers.
Acetylene Generator installation.

FOUNDRY EQUIPMENT:

1—Hydro Blast system.
1—Pangborn shot blast.
1—Pit annealer.
1—4-ton Alliance wall crane.
1—No. 3 Simpson intensive mixer.
Core and drying ovens—cars.
Sand handling equipment, bins, etc.
Conveyors, elevators, batch scales.
Maxon mold dryers.
Squeeze and Jolt machines.
Swing and pedestal grinders.
Flasks, Gravity conveyors.
Hyster Krane.
Tramrails, hoists.
Chipping hammers, rammers.

OPEN HEARTH DEPT:

2—25-ton open hearths. 1—5-ton Alliance Charging Machine. 1 lot Charging boxes. 1 lot Ingot mold and charging cars. 3—25-ton Ladles, bails and covers.

HETZ CONSTRUCTORS, INC.

INDUSTRIAL AUCTIONEERS—LIQUIDATORS—APPRAISERS

P.O. Box 671 **WARREN, OHIO** **Ph. Niles 2-2509**

You asked for it... HERE IT IS—

AO's New Metal Ful-Vue Safety GOGGLE!

HANDSOMER IN APPEARANCE • **STRONGER** IN STRUCTURE

With the introduction of the F4100 Metal Ful-Vue, AO's protection against the impact of flying particles reaches its highest development. Here in one goggle, with or without side shields, workers can obtain the peace of mind which comes from assured safety . . . the utmost in comfort over nose and temples . . . the very finest in EYE APPEAL PLUS EYE PROTECTION!

QUICK FACTS

NEW EYEWIRE — A major contribution to *looks with strength.* Outer edges are square instead of round with a deep groove to hold lenses securely in place. Beaded engraving adds a distinctive touch. The lightweight eyewire is strong and durable.

NEW RUGGED ENDPIECE—Streamlined . . . with a wide bearing surface at hinge which minimizes temple drop. Screw heads are countersunk and flush with endpieces for added good looks, non-sagging security.

NEW LIGHTWEIGHT TEMPLE—Oval temples instead of round for greater comfort and attractiveness. Easily adjusted, perspiration proof. Insulated semi or half tubing is another appearance improver and will outlast life of the temple. Tubing will not come off and it can't be discolored by dirt or grease. Both the temple and endpiece screws are AO patented "Ever-tite" construction . . . they keep tight in service yet remove quickly when replacing lenses.

IMPROVED GUARD ARMS AND BRIDGE — Guard Arms are newly shaped — longer with more opening for added ease of adjustment. The bridge is double braced with four contact joints — a feature found only in AO Ful-Vue spectacle goggles.

NEW SIDE SHIELD CONSTRUCTION — A real time saver . . . new one-piece binder and eyewire construction *eliminates necessity of inserting the screen before inserting lenses!* Replacement of lenses can now be made without any interference with or from the side shield.

For these and many other reasons, be sure to see the new F4100. YOUR NEAREST AO SAFETY REPRESENTATIVE CAN SUPPLY YOU.

American Optical COMPANY
SAFETY PRODUCTS DIVISION

SOUTHBRIDGE, MASSACHUSETTS • BRANCHES IN PRINCIPAL CITIES

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Can You Top this?

The Chemalloy Foundry Company of Louisiana, Missouri, speaks for M C Dip-Out Furnaces

Here is actual proof of the economy that Stroman M C Reverberatory Dip-Out Furnaces for aluminum effect in actual operation. They are a combination of melting and holding furnaces that produce the highest quality casting and always have hot metal available for dipping. They are ideal for permanent mold, die casting, or sand casting plants. Bath capacities range from 500 to 10,000 pounds. Jim Maddern of Chemalloy says the rest. Install a Stroman M C in your plant and turn these savings into profits, while making working conditions much more pleasant for your men!

CHEMALLOY FOUNDRY COMPANY

ALUMINUM — BRONZE — BRASS CASTINGS
PERMANENT MOLDING

LOUISIANA, MISSOURI

June 14, 1950

Mr. J. L. Stroman
Stroman Furnace & Engineering Company
9900 Franklin Avenue
Franklin Park, Illinois

Dear Mr. Stroman:

We have just finished checking costs with our auditing department and have come up with some astonishing facts and figures which to us are pleasing to say the least. So, I am passing them on as I am sure you would like to know how your furnaces compare to others.

The M C Reverberatory Aluminum furnace we bought from you a year ago certainly was the finest investment we ever made. Here are actual costs of operation on the M C and former pot equipment for one year on a production schedule of a monthly melt of 200,000 lbs. with a 100,000 lb. yield. We found that pot furnaces cost us as follows;

Pots	$5200.00
Fuel	5400.00
Direct Labor	8000.00
Indirect Labor	2750.00
Total	$21,350.00

The one M C we are now operating to replace the pots costs as follows:

Refractory Lining	$ 400.00
Fuel	2400.00
Direct Labor	6000.00
Indirect Labor	470.00
Total	$9270.00

That this saving of $12,080.00 in one year's time with one furnace, makes us very happy is needless to say. Also, our men find it much easier to work with and around, and it gives us a happier personnel.

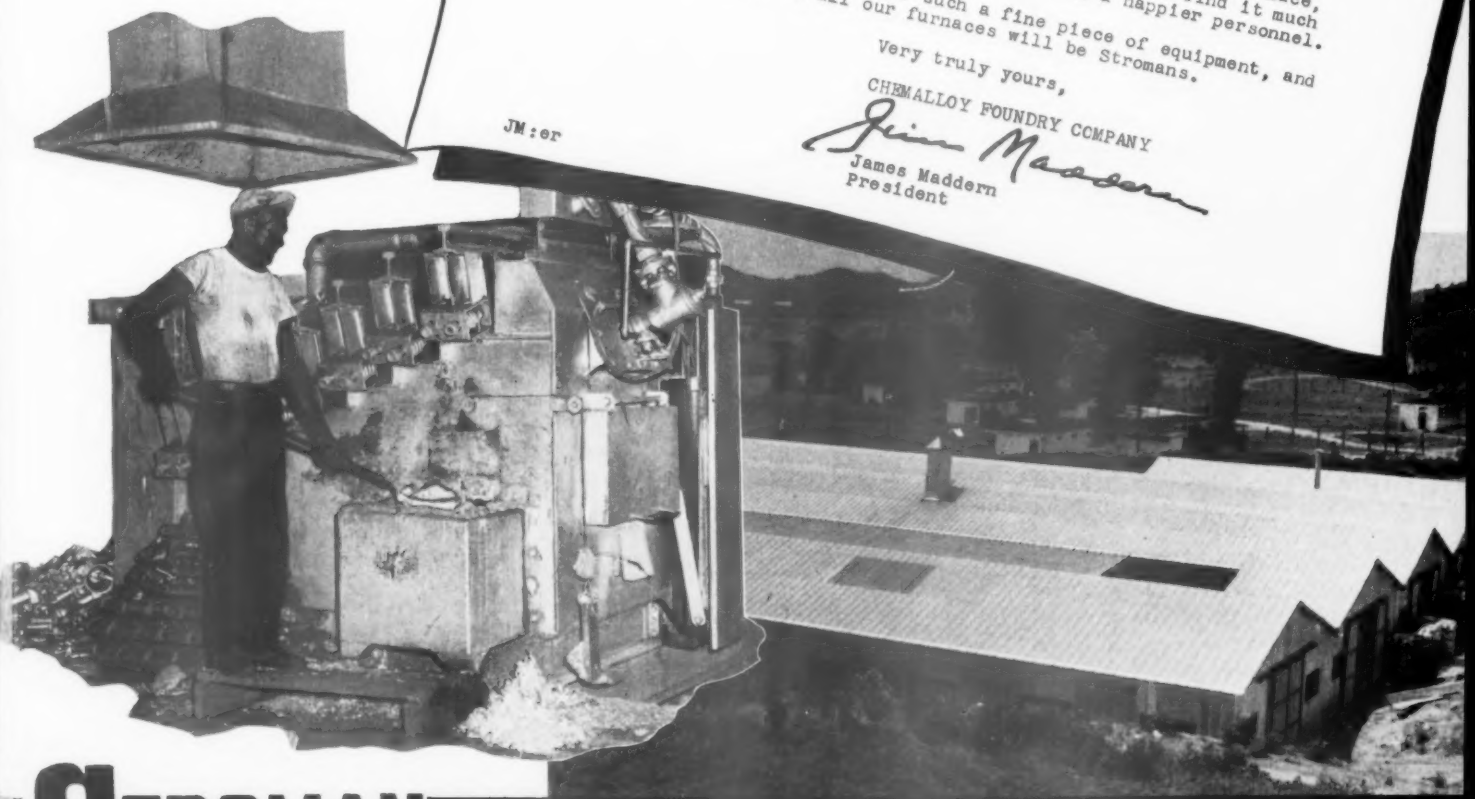
Congratulations on the design of such a fine piece of equipment, and you can bet from now on all our furnaces will be Stromans.

Very truly yours,

CHEMALLOY FOUNDRY COMPANY

James Maddern
President

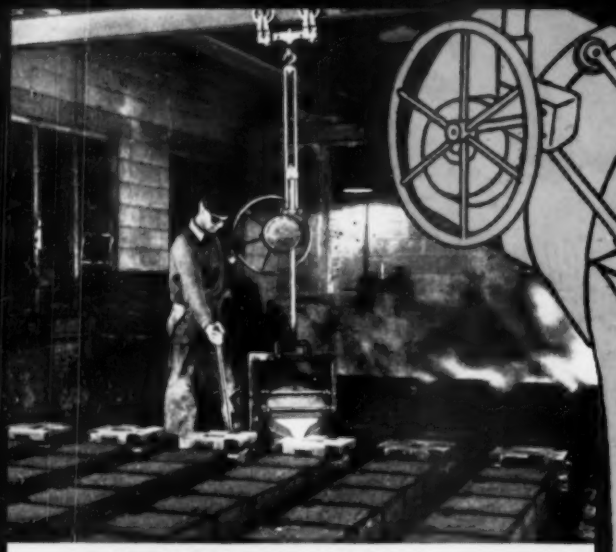
JM:er



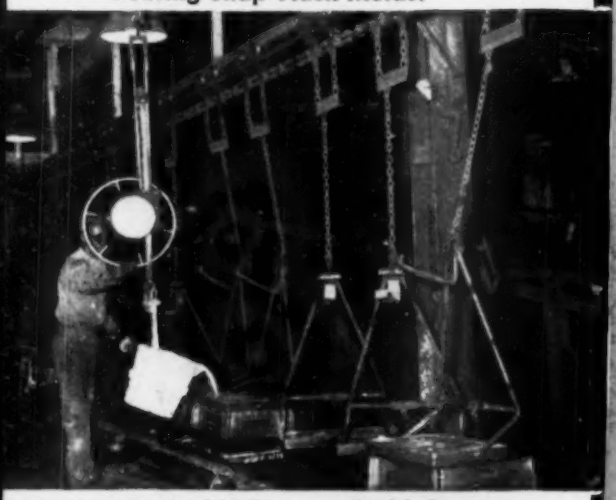
STROMAN FURNACE & ENGINEERING CO.

DIVISION OF

THE PETERSEN OVEN CO. • 9900 FRANKLIN AVE. • FRANKLIN PARK, ILL.

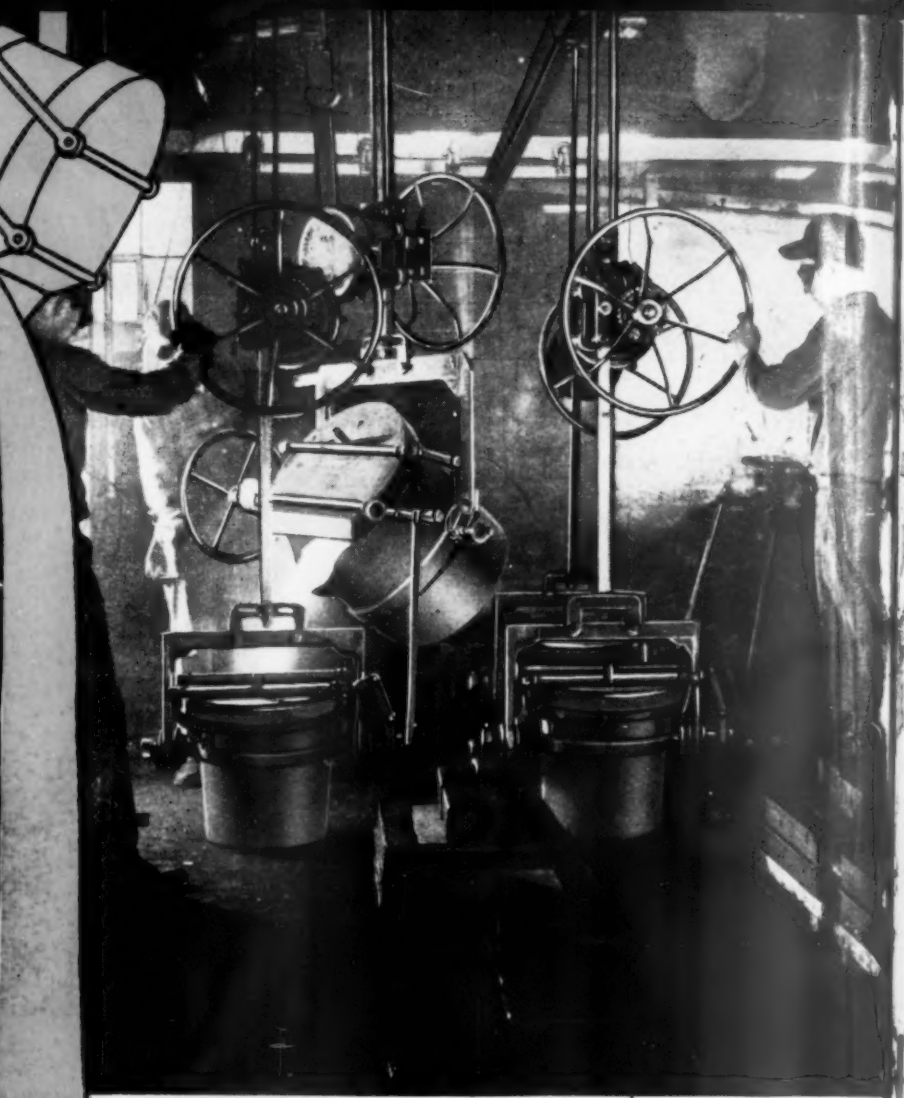


Pouring Snap-Flask Molds.



Pouring Malleable Iron on Mold Conveyor

Two-Up Pouring from adjacent cranes on individual runways. Easy transfer from crane to crane, via stationary cross-over, provides full floor coverage . . . circumventing such obstacles as building columns.



Pouring Ladles receiving metal from a Distributing Ladle.

MODERN
POURING SYSTEMS

. . . engineered for Full Floor Coverage coupled with High-Efficiency, Low-Cost Pouring . . . are delivering Top Performance in hundreds of top flight foundries. Write for Descriptive Bulletins 142, 143 and 143-B, or ask your MODERN Representative.

MODERN EQUIPMENT CO.

PORT WASHINGTON, WISCONSIN

Cupolas • Cupola Chargers • Covered and Insulated Ladles • Lifetime Geared Ladles • Improved Bottom Pour Ladles • Metal Pouring Systems • Crane and Monorail Systems for Metal and Mold Handling • Furnace Charging Cranes • Electric Cranes

GET PERFECT LIFTS WITH GREATER ECONOMY

Photo—Courtesy of Hackett Brass Co., Detroit, Mich.

SPECIFY STEVENS SNO-WHITE NON-SILICA PARTING

Stevens Sno-White Non-Silica dry parting gives perfect lifts of sand from either matchplates or loose patterns. Because it is extremely fine, it will cling to vertical pattern surfaces, making difficult draws easy. Sno-White will work equally well with either hot or cold sand.

This dry parting is also extremely economical to use. Because of its fine texture, a thinner film is required. And since it is white in color it is easy to see on the pattern frame, allowing a minimum of dusting. Customers report they use less—rather than more Sno-White parting and get better castings than ever before.

Stevens makes facings to meet every foundry condition and requirement. If you have a casting problem write to us giving full information about your work and installation. Our expert technicians will analyze your operations and submit a recommendation to improve your results. There's no cost or obligation for this service.

LEADING MANUFACTURERS AND DISTRIBUTORS OF FOUNDRY FACINGS, EQUIPMENT AND SUPPLIES

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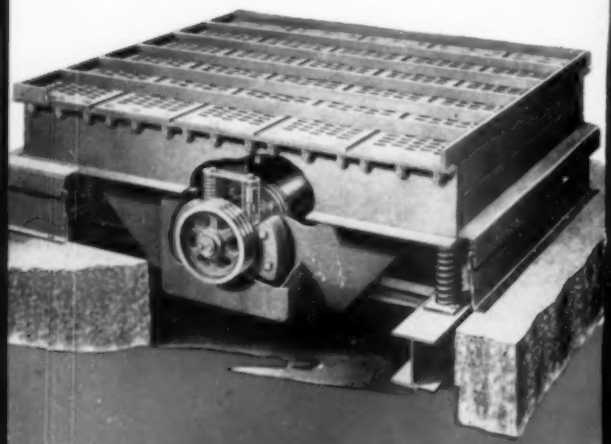
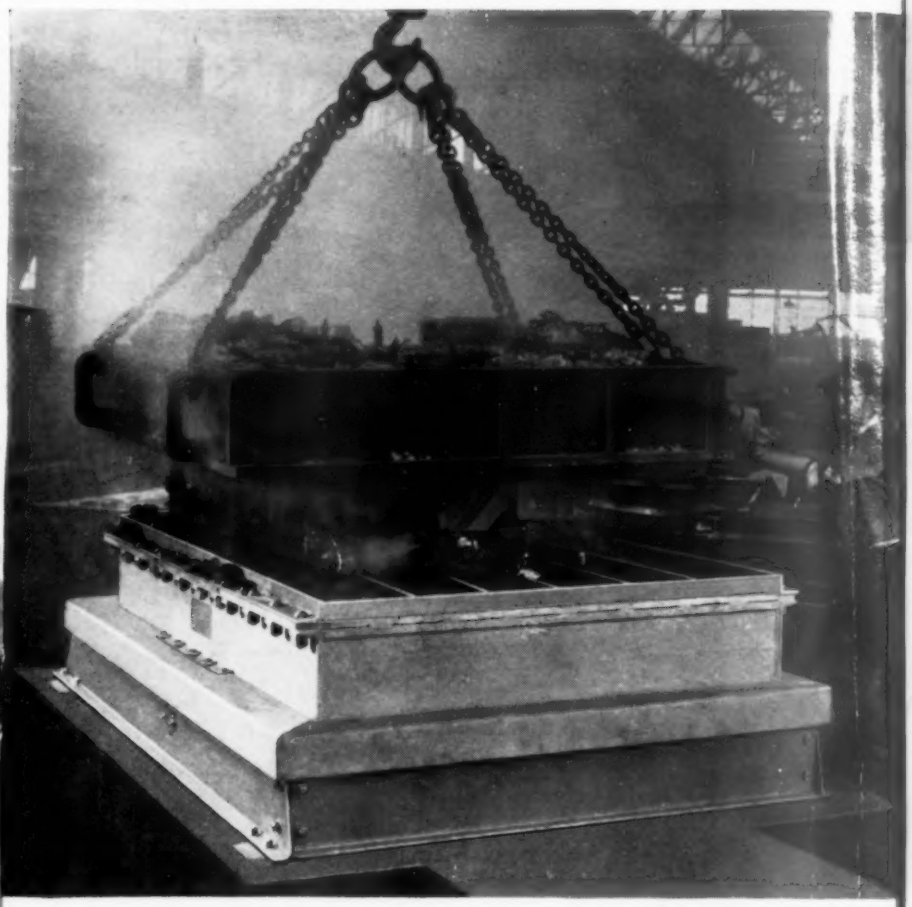
Heavy Duty FOUNDRY SHAKEOUTS

Fast, Positive, Clean Separation of Castings from Flasks and Sand





CHECK THESE FEATURES

Heavy duty, square-end helical springs carry all impact forces; insure efficient transfer of vibratory motion to live deck.

Enclosed, full-floating vibrating mechanism. Automatic, unbalance weights eliminate critical speed-range hazards of fixed unbalance weights; low starting torque permits use of lower hp. motors.

Controlled amplitude of vibration obtained by varying amount of segmental weights in unbalanced weight assembly.

Built-in sand hopper.

Six single sizes—capacities to 30,000 pounds.

Here's new, ready-for-action efficiency in fast, positive, clean separation of castings from flasks and sand. Link-Belt Heavy Duty "CA" Shakeouts are the full-floating type with automatic unbalanced weight control. Ruggedly constructed to withstand severe dust and temperature conditions as well as heavy surge loads from large flasks and castings, they replace laborious manual flask emptying.

ADVANTAGES

Continuous straightline operation for greater output. *Centralized dust control* improves plant conditions. *Reduce flask damage. Simplify reclamation* of reinforcing rods, gaggers and sprues.

Get in touch with our nearest office for full information. Ask for Folder No. 2338.

LINK-BELT

HANDLING AND SAND PREPARATION EQUIPMENT

12,021

LINK-BELT COMPANY

Chicago 9, Indianapolis 6, Philadelphia 40, Atlanta, Houston 1, Minneapolis 5, San Francisco 24, Los Angeles 33, Seattle 4, Toronto 8, Johannesburg. Offices in Principal Cities.